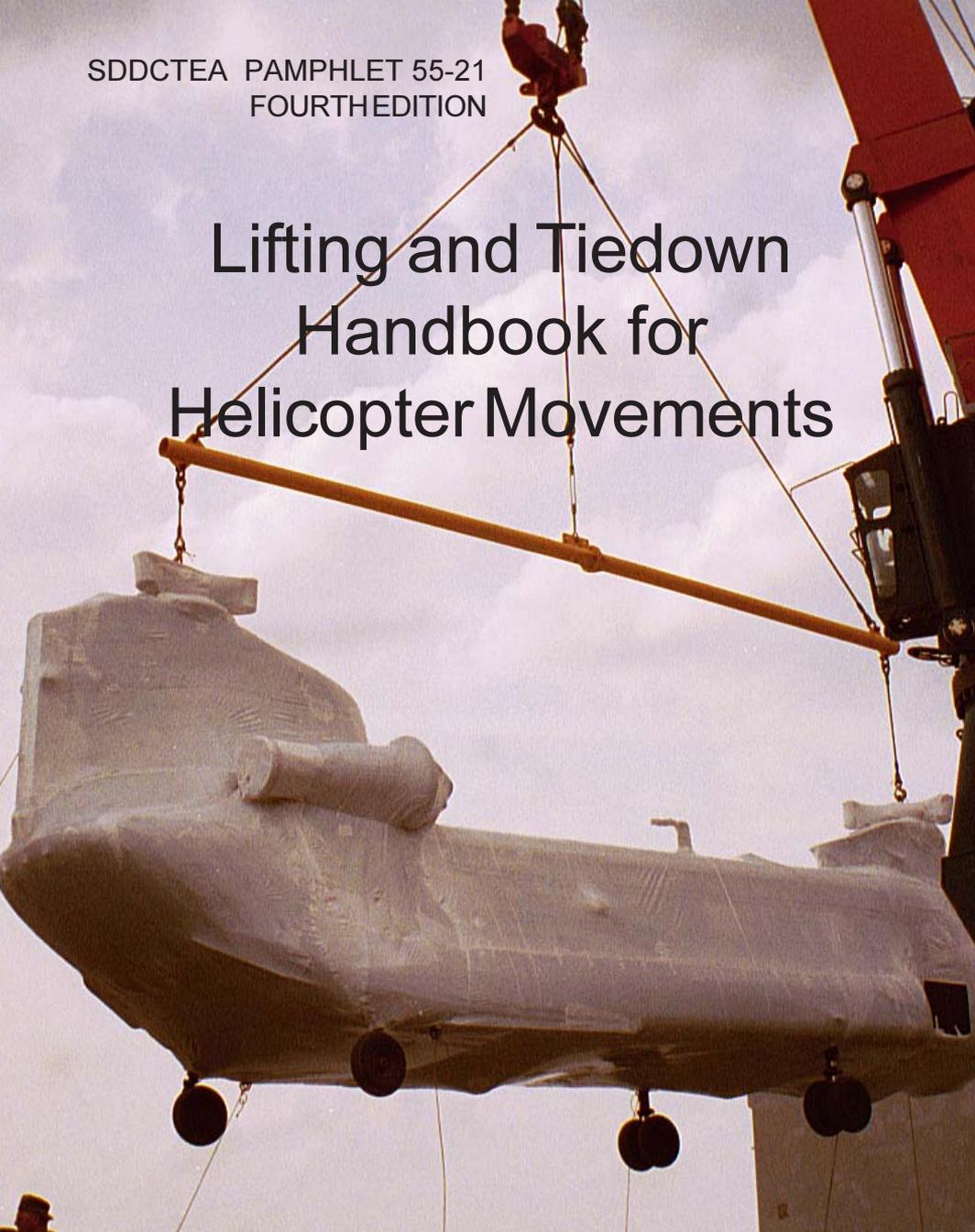


SDDCTEA PAMPHLET 55-21  
FOURTH EDITION

# Lifting and Tiedown Handbook for Helicopter Movements



**SDDCTEA**

**PAMPHLET 55-21**

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TRANSPORTATION AND TRAVEL

**LIFTING AND TIEDOWN  
HANDBOOK FOR  
HELICOPTER MOVEMENTS**

**FOURTH EDITION**

**July 2006**

Jennifer Napiecek  
Daniel Nonnemacher

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Military Surface Deployment and Distribution Command  
Transportation Engineering Agency  
Newport News, Virginia  
[www.tea.army.mil](http://www.tea.army.mil)

This is the fourth edition of this handbook. It supersedes the third edition, *Lifting and Tiedown Handbook for Helicopter Movements* (June 2002). However, copies of the older editions still have value, and you may continue to use any copies you have. Between printings, the most current information can always be found online at **[www.tea.army.mil/pubs/nr/dep/fgpamphlets/PAM\\_55-21.pdf](http://www.tea.army.mil/pubs/nr/dep/fgpamphlets/PAM_55-21.pdf)**. For this edition, we have updated all the information and added more information on lifting the CH-47 and AH-64 helicopters.

This book is part of the following series:

TEA PAM 55-19, *Tiedown Handbook for Rail Movements*

TEA PAM 55-20, *Tiedown Handbook for Truck Movements*

TEA PAM 55-21, *Lifting and Tiedown Handbook for Helicopter Movements*

TEA PAM 55-22, *Marine Lifting and Lashing Handbook*

TEA PAM 55-23, *Containerization of Military Vehicles*

TEA PAM 55-24, *Vehicle Preparation Handbook for Fixed Wing Air Movements*

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### NOTE

This pamphlet is unofficial and provides only a quick reference and familiarization in the transport of U.S. military helicopters. Although it has been staffed extensively throughout the aviation community, some modifications and helicopter design variations may not appear in this reference. Official procedures for the preparation, disassembly/reassembly, lifting, and tiedown are outlined in the *Preparation for Shipment Manuals* listed in the Bibliography of this pamphlet. Technical assistance for the preparation, disassembly/reassembly, lifting, and tiedown of U.S. military helicopters may be obtained from Headquarters, U.S. Army Aviation and Missile Command (AMCOM), ATTN: AMSAM-MMC-MM-DT, Sparkman Building 5302, 2nd Floor, Redstone Arsenal, AL 35898-5230, DSN 645-8281 or (256) 955-8281, or Janice.Hopkins@us.army.mil. Additionally, you can download the complete helicopter shipping manuals from the following website: <http://www.logsa.army.mil/etms/online.htm>

### Preface

The purpose of this pamphlet is to aid the shipping unit and provide general guidelines for helicopter transport.

This pamphlet contains general information concerning lifting and tiedown procedures on U.S. military helicopters. Helicopters are extremely fragile, high-dollar materiel; extreme care must be taken to ensure proper and safe transport.

This pamphlet provides general guidance only. All preparation, lifting, and tiedown must be in accordance with the *Preparation for Shipment Manual* for the helicopter being shipped. All ground handling of helicopters must be supervised by trained aviation personnel. All rigging of helicopters for lifting must be directed by aviation personnel, trained and on unit orders to supervise rigging operations. Helicopter models vary; therefore, it is the responsibility of the deploying unit to provide the appropriate technical manuals and to prepare and secure the proper equipment for transport of its aircraft.

TEA welcomes comments and recommendations. Please prepare comments on a memo using the same format as DA Form 2028 or a marked copy of the page(s) of this publication. Forward to:

Military Surface Deployment and Distribution Command  
Transportation Engineering Agency  
ATTN: SDTE-DPE  
720 Thimble Shoals Blvd, Suite 130  
Newport News, VA 23606-4537

Address email messages to: [dpemail@tea.army.mil](mailto:dpemail@tea.army.mil). Telephone inquiries may be made by calling DSN 826-4643, commercial (757) 878-4643, or 1-800-722-0727. Make requests for additional copies to this same address or use our internet order form at the following URL: **[http://www.tea.army.mil/pubs/pubs\\_order.htm](http://www.tea.army.mil/pubs/pubs_order.htm)**.

After action/lessons learned information is requested from units involved in shipping helicopters. Send the above information and requests for technical assistance to the technical point of contact at:

HQ U.S. Army Aviation and Missile Command  
ATTN: AMSAM-MMC-MM-DT  
Sparkman Building 5302, 2nd Floor  
Redstone Arsenal, AL 35898-52309  
DSN 645-8281 or (256) 955-8281

# Lifting and Tiedown Handbook for Helicopter Movements

## CONTENTS

<i>Section</i>	<i>Page</i>
I. General Guidelines .....	1
II. Definitions .....	3
III. Required Loading Equipment .....	4
A. Disassembly of Aircraft .....	4
B. Additional Equipment Required for Assembly of Aircraft after Debarkation .....	5
IV. Planning and Preparation for Shipment .....	6
A. Planning .....	6
B. Shipping Configuration .....	6
C. Shipping Responsibility .....	7
D. Shipping Precautions .....	7
E. Preparation Guidelines .....	8
F. Helicopter Preservation for Shipment .....	9
V. General Lifting Procedures .....	10
VI. General Tiedown Procedures .....	11
A. General .....	11
B. Marine Shipping .....	12
C. Highway Shipping .....	15
D. Air Shipping .....	15
VII. Intransit Care for Marine Shipments .....	18

## Appendixes

	<i>Page</i>
A UH-1 Iroquois .....	A-1
B CH-47 Chinook .....	B-1
C OH-58 Kiowa Warrior.....	C-1
D UH-60 Black Hawk .....	D-1
E AH-64 Apache .....	E-1

## Bibliography and Index

*Located at the end of the handbook*

## Section I. General Guidelines

**A.** This pamphlet provides users with general guidance for the preparation for shipment, lifting, and tiedown of U.S. military helicopters during transport. It contains basic information from a variety of sources and from experience gained from loadouts and live deployments.

**B.** Because of the complexity of helicopter preparation and loading procedures, predeployment planning is essential. Transport mode assignment should be identified as early as possible to allow adequate planning. The shipping configuration should minimize disassembly. This helps reduce assembly and test flight requirements upon arrival at the port of debarkation (POD).

**C.** Helicopters loaded onto a transportation asset must be secured with chains or straps to counteract longitudinal, lateral, and vertical forces. It is essential that chains or straps be tightened only enough to remove slack; over tightening of chains or straps can result in structural damage to the helicopter. If using straps for restraint, only use straps with the standard short or short and wide ratchet handles. **DO NOT buy straps with the long wide ratchet handle.** Tiedown provisions can be easily damaged when using ratchet handles with long wide handles. Bridging (blocking and bracing) of helicopters is not authorized. All aircraft preparation, lifting, and tiedown must be in accordance with the appropriate helicopter *Preparation for Shipment Manuals* and the specific *Loading Instructions Manuals* for military aircraft (fixed-wing air shipments only). *Preparation for Shipment Manuals* and *Loading Instructions Manuals* are listed in the Bibliography at the back of this pamphlet and the *Preparation for Shipment Manuals* can be accessed from the following website: <http://www.logsa.army.mil/etms/online.htm>.

**D.** The following “guidelines” apply to all types of helicopters:

### 1. Personnel

Shipment of a helicopter requires at least two aircraft maintenance personnel, qualified in the lifting and tiedown of military helicopters.

### 2. Handling

Helicopter ground handling must be accomplished only by qualified aviation personnel, preferably from the deploying unit.

### **3. Packaging**

All rotating helicopter parts such as main and tail rotors must be positively secured to prevent them from moving while loading or during shipment. All removed components must be preserved and packed for transport in accordance with the appropriate *Preparation for Shipment Manual*.

### **4. Marine Shipment**

Helicopters shipped by marine mode must be stowed below deck. Careful stow planning is required to ensure that larger aircraft will fit and can be maneuvered below deck. The overall height and width is of the most concern. Weather deck shipment is a high-risk option and should be considered only as a last resort. This is particularly true of UH-1 and OH-58 series helicopters because of inadequate tiedown provisions. Rotor blades must be removed from all aircraft shipped above deck. The corrosive effects of above deck transport must be considered. The shrink wrap usually does not stand up to the weather conditions seen above deck.

### **5. Air Shipment**

Helicopters shipped by military fixed-wing aircraft are not normally shrink wrapped prior to loading. Because of low clearances beneath some helicopters, particularly AH-64 helicopters, plywood approach shoring will be required to reduce the ramp angle during loading. The shipping unit is responsible for providing shoring.

### **6. Highway Shipment**

Helicopters are not normally shipped by highway transport during deployments; however, this mode is typically used for recovery operations.

### **7. Responsibility**

Aircraft maintenance personnel must provide technical assistance and supervise lifting and tiedown (lashing) of the helicopter on its transporter. During transport, the helicopter is the responsibility of the shipping unit.

## Section II. Definitions

**FSS (Fast Sealift Ship)** - Fast (27 kts) Military Sealift Command (MSC) cargo ships capable of roll-on/roll-off loading and equipped with on-board cranes and self-contained ramps.

**LMSR (Large Medium Speed Roll-on/Roll-off)** - Medium speed (24 kts) cargo ship capable of roll-on/roll-off loading and equipped with on-board cranes and self-contained stern and side ramps.

**Tactical Highway Transport** - A short haul (not to exceed 100 miles) shipment by military M270A1 semitrailer.

**Logistical Highway Transport** - A long haul (in excess of 100 miles) shipment by standard commercial flatbed trailer with air-ride suspension.

**Reduced for Sealift Operational** - Helicopters reduced to the required minimum to facilitate rapid deployment, the tail pylon will remain intact and the main rotor blades may be folded.

**Reduced for Sealift** - Helicopters reduced to facilitate rapid deployment, the tail pylon must be folded and the main rotor blades may be folded (except for the UH-1).

**CAGE** - A number used by the government to identify the manufacturer of a particular part.

**F.S. (Fuselage Station)** - Location on the helicopters fuselage measured in inches from the nose of the helicopter or other arbitrary datum point.

## Section III. Required Loading Equipment

This is an outline of the resources required for shipment that must be provided at the port of embarkation (POE) through a combination of Port Support Activity (PSA) and deploying unit assets. Coordination is essential to ensure the availability of assets, manpower, equipment, and materials at the POE and is the responsibility of the deploying unit. Availability of the following must be considered:

### A. Disassembly of Aircraft

1. Aircraft shipping and maintenance manuals.
2. Tow bars, towing bridles, and vehicles.
3. Crane trucks, self-propelled crane aircraft maintenance and positioning (SCAMP), and forklifts.
4. Fuel truck (to fuel/defuel aircraft).
5. Maintenance stands.
6. Generator Power Unit (GPU) or Auxiliary Ground Power Unit (AGPU).
7. Aircraft covers (flyaway gear).
8. Grounding cables.
9. Shrink wrap equipment and materials.
10. General mechanics tool sets and special tools required for aircraft disassembly /assembly.
11. Fire fighting equipment.
12. Fire truck (coordinate through port facility).
13. Combustible gas indicator with certified operator (coordinate through port facility).
14. Restraint devices and tiedown provisions.

15. Lifting devices, special slings, adapters, taglines (rope) and other hoisting equipment as specified in the aircraft manual.
16. Main rotor blade boxes (for removed rotor blades).
17. Main rotor blade slings (to remove main rotor blades).
18. Blade folding tools/fixture.
19. Ground handling wheels.
20. Armament tool sets.
21. Rocket pod/missile launcher containers.
22. Crates for removed components. Tags and zip-lock bags are useful for storing hardware and some components. Plastic bubble wrap is needed to protect sensitive components that must be removed.
23. Wheel chocks.
24. Spare tires for helicopters.
25. Cherry picker or similar personnel lifting device for lifting personnel for helicopter rigging for lift-on-lift-off operations.

#### **B. Additional Equipment Required for Assembly of Aircraft after Debarkation**

1. Bore-sight equipment.
2. Pitot static system tester.
3. Appropriate tracking and balancing equipment or the Army Vibration Analyzer (AVA).

Ground handling and lifting devices must accompany the aircraft and be readily accessible for unloading at the POD.

## Section IV. Planning and Preparation for Shipment

### A. Planning

Predeployment planning is essential to a successful deployment of aviation assets. On receipt of the port call, the deploying unit transportation officer should proceed as follows:

1. Contact the designated staging area commander at the POE.
2. Provide the POE point of contact with the characteristics of the equipment to be shipped (dimensions and weight) and any tactical consideration impacting the shipping configuration of the helicopters.
3. Coordinate POE support requirements directly with PSA only after direct coordination has been made with the POE terminal/port commander.

**Note:** Port support for Forces Command (FORSCOM) aviation assets can be provided by selected elements of the Army National Guard (ARNG), Aviation Classification and Repair Activity Depots (AVCRADs) through the Headquarters, Aviation Depot Maintenance Roundout Unit (HQ ADMRU). These elements can provide a wide range of services to deploying aviation units to include but not limited to aircraft preparation, preservation (to include application of shrink film), maintenance support through Aviation Intermediate Maintenance (AVIM), and technical assistance on aircraft upload and tiedown. Request ADMRU support through CNGB, ATTN; NGB-AVS, 111 S. George Mason Drive, Arlington, VA, 22204-1382, telephone (DSN) 327-7700 to Commander, HQ ADMRU, Bldg E4305 (Edgewood Area), Aberdeen Proving Ground, MD, 21010-5401, telephone DSN 584-3395/3495/2015 or (410) 436-3395/3495/2015, (FAX) 2044. PSAs for other MACOMs are assigned by the MACOM deployment regulation (FORSCOM/ARNG 55-1, *Unit Movement Planning*, dated 1 Mar 00). Timely notification and coordination is required to ensure adequate support.

### B. Shipping Configuration

Helicopter configuration must be in accordance with the shipping manual. The configuration required for helicopter shipment will be determined by the following:

1. Mode of transportation.
2. Type of transporter.
3. Tactical deployment.

For tactical deployments, disassembly should be kept to an absolute minimum to minimize assembly/depreservation time at Port of Debarkation (POD).

### C. Shipping Responsibility

Army helicopters must be preserved and prepared for shipment in accordance with the applicable *Preparation for Shipment Manual*. The shipper/deploying unit prepares the helicopters for shipment as follows:

1. Provide equipment and manpower.
2. Requisition the required shrink wrap.
3. Package removed parts and equipment.
4. Preserve the helicopters as required in the shipping manual.
5. Adjust fuel level per the recommended fuel system preparation.
6. For marine mode, apply heat shrink film protective covering materials.
7. Arrange for transport equipment.
8. Assist staging area personnel in the loading and tiedown of the helicopters.

Supply of the material is to be accomplished through the normal supply channel.

### D. Shipping Precautions

1. For marine modes, shipment of helicopters on the weather deck of a vessel is a high-risk option, structurally and because of the corrosive environment, and is not recommended.
2. OH-58 and UH-1 series helicopters have deficient tiedown provisions. Special tiedown procedures have been developed to compensate for these deficiencies.
3. Do not push UH-60 or AH-64 helicopters up the ramp. Tow only.
4. Use towing bridles as required.
5. Avoid stepping on tiedown chains or straps to avoid damage to the helicopter restraint provisions.

6. Make sure lifting and/or tiedown provisions are not covered up by shrink wrap.
7. Do not over tension tiedown chains or straps as damage may occur to tiedown provisions.
8. Do not run chains or straps through the provisions. Attach each chain or strap directly to the provisions. The only exception to this is when straps are used on the FS 120 tiedowns on the AH-64. See page E-11 for more information.

### **E. Preparation Guidelines**

1. Color code rotating components (blades, controls, etc.) prior to removal.
2. Tag all removed components.
3. Bag, tag, and attach removed hardware to aircraft or removed component as appropriate.
4. Preserve and package removed components in special reusable containers or crates as appropriate.
5. Mark each container, crate, and helicopter with contents, gross weight, and center of gravity.
6. Adjust fuel level (see fuel system preservation guidance in Preparation for Shipment Manual).
7. Install flyaway gear (intake covers, exhaust covers, pitot tube covers, etc.).
8. Use wing walkers and brakemen for all towing and ground handling.
9. Provide technical assistance to the staging area commander. Establish a rapport with the commander and a unit technical focal point.

Aviation units should arrive at POE with the necessary equipment available for both roll-on/roll-off (RORO) loading and lifting. Refer to appropriate helicopter Preparation for Shipment Manual (see Bibliography at end of this pamphlet) for more detailed information on preparing the helicopters for shipment.

## **F. Helicopter Preservation for Shipment**

1. Besides assets, manpower, equipment, and materials needed at the POE (listed for air/marine shipment), all helicopters must be preserved in accordance with the Preparation for Shipment Manual. Preservation for vessel shipment is similar to preservation for intermediate storage. Refer to appropriate aircraft Preparation for Shipment Manual for helicopter preservation procedures.
2. The extent of preservation required for the fuel system is identified in the appropriate technical manuals.
3. Shrink wrap materials, equipment, installation instructions, and manpower requirements are provided in appendix G of Preparation for Shipment Manuals. Apply heat shrink wrap protective covering on all military helicopters being shipped via the marine mode regardless of the location of the helicopter on the vessel. Protective covering must also be applied to those helicopters being shipped by tractor-trailer on highways. The level of protection required for short-distance shipments will be determined by the shipper. Heat shrink wrap is not normally applied for air shipments.

**WARNING: When applying shrink wrap, make sure lifting and tiedown provisions are exposed and accessible**

## Section V. General Lifting Procedures

The following lifting guidelines are used for highway and marine transport.

- A. The lifting procedures published in this pamphlet summarize the procedures in the *Preparation for Shipment* manual.
- B. Inspect all lifting equipment prior to movement to the staging area.
- C. Replace all defective equipment; inspect equipment again prior to use.
- D. Make sure shrink wrap does not cover up lifting provisions.
- E. Helicopters must be rigged for lifting only by properly trained aircraft maintenance personnel on unit orders to supervise lifting operations, using the appropriate *Preparation for Shipment* Manual.
- F. Tag lines must be attached to each helicopter at a minimum of three (AH-64, UH-60 series) or four points (all others).
- G. Ground handling and lifting devices must accompany each aircraft shipment and must be readily accessible for unloading.
- H. For UH-1 and AH-64 helicopters, or other helicopters without longer, multileg, slings, attach a short pendant (3'-5') below the crane hook. Pendant will allow some clearance if the hook is not centered on the main rotor mast for connection.

## Section VI. General Tiedown Procedures

The procedures in this section are to be used as a general guide only.

### A. General

1. The tiedown procedures published in this pamphlet summarize the procedures in the *Preparation for Shipment* manual.
2. Inspect all tiedown equipment, ensuring tiedown provisions are installed, prior to movement to the staging area.
3. Aircraft maintenance personnel must supervise tiedown (lashing) of helicopters. The shipping unit provides technical assistance on the tiedown of their aircraft.
4. Chock all wheels as required.
5. Maintain at least 12 to 18 inches clearance between helicopters and bulkheads.
6. Make sure shrink wrap does not cover up tiedown provisions.
7. Attach chains or straps directly to provisions. Do not run chains or straps through the provisions.
8. Blocking and bracing (shoring) between helicopters is not authorized.
9. Ensure that tiedown chains or straps do not chafe on helicopters.

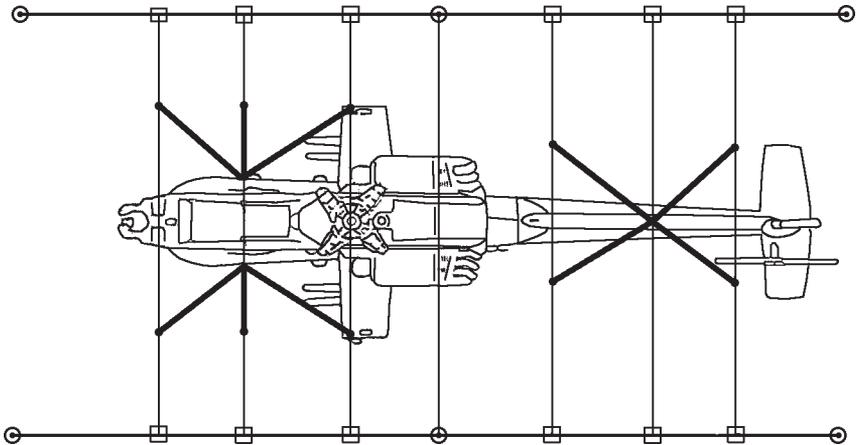
**WARNING:** Do not attempt to preload restraint straps or chains on mooring fittings. All restraints are to be tightened only until slack is removed. Over tensioning tiedowns can damage the aircraft.

## B. Marine Shipping

Tiedown chain and strap angles on helicopters are critical. The number of tiedown points on some vessels are very limited. When tiedown points are not sufficient, provide helicopter tiedown points by running vessel lashing gear (chains) between vessel tiedown points. Connect additional lashing gear, as required, to provide a grid on the vessel deck that will provide tiedown points at the required angles. These chains should be as tight as possible and in place before any helicopter restraint devices are installed. Follow the instructions below and proceed as illustrated on page 13.

1. Stow helicopters as required inside the vessel.
2. Install wheel chocks as required.
3. If required, connect chains (vessel's lashing gear with a breaking strength of at least 70,000 lbs) between deck lashing points as appropriate. Make these chains as tight as possible. Connect chains (with a breaking strength of at least 70,000 lbs) between "deck chains" as required to provide tiedown points. Make these chains also as tight as possible.
4. Install helicopter restraints (chains or straps). They are to be tightened only enough to remove slack. If restraint devices are too slack, the helicopters will be damaged due to movement. Over-tightening will also cause structural damage. Special procedures have been developed for OH-58 and UH-1 series helicopters because of inadequate tiedown provisions.
5. Dunnage is not required or authorized as a restraint procedure for helicopters. Helicopters must be tied down with straps and chains only.
6. The Aviation and Missile Command has approved the use of polyester straps for marine transport of helicopters. It is SDDC policy that polyester straps be used for tying down helicopters on marine vessels. Terminal commanders are responsible for ensuring that the straps are available and are properly installed. Guidance for the purchase and use of polyester straps for marine transport of helicopters is shown on page 14.

## Tiedown Grid (apply when necessary)



-  —  Chains between deck lashing points (DECK CHAINS). Install first and as tight as possible.
-  —  Chains between DECK CHAINS. Install as tight as possible.
-  Tiedown chains. Install last and tighten only enough to remove slack.

**Warning: Do not place skids on top of deck chains.**

## Polyester Strap Specifications

### UH-60 helicopter

Polyester 3" ratchet straps (standard or wide ratchet)

Breaking strength - **15,000** lbs or more

End hardware - wire hook

Number required per helicopter - 8

### AH-64 helicopter

Polyester 2" ratchet straps (standard or wide ratchet)

Breaking strength - **10,000** lbs or more

End hardware - wire hook

Number required per helicopter - 10

### OH-58 helicopter

Polyester 2" ratchet straps (standard or wide ratchet)

Breaking strength - **5,000** or **6,000** lbs

End hardware - wire hook

Number required per helicopter – 11

**Note:** The standard military 5,000 pound general purpose strap (NSN 5340-01-204-3009) can also be used on the OH-58.

### CH-47 helicopter

Polyester 3" ratchet straps (standard or wide ratchet)

Breaking strength – **15,000** lbs or more

End hardware – wire hook

Number required per helicopter – 18

### UH-1 helicopter

Polyester 2" ratchet straps (standard or wide ratchet)

Breaking strength – **10,000** lbs or more

End hardware – wire hook

Number required per helicopter - 9

**Warning:** Do not buy the ratchet with the long AND wide handle since it's easier to over-tension using this type of ratchet. Before each use, straps should be inspected for burns, tears, punctures, cuts, caustic damage, oil or grease contamination, and fraying or broken stitches. Also, their metal parts should be inspected for improper operation, corrosion, cracks or distortion. If any of these conditions exist, the strap should be replaced.

### C. Highway Shipping

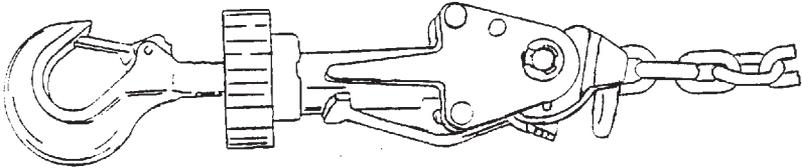
When transported on highways, helicopters must be loaded on trailers that have air ride suspension and the ability to support a 20,000 pound minimum load. Air ride suspension is required because transport on semitrailers with spring suspension may cause damage to the helicopter. The tractor should also have air ride suspension and be capable of pulling a minimum load of 20,000 pounds. For tactical transport of helicopters (distance less than 100 miles) an M270A1 military trailer may be used along with a 5-ton truck tractor. For logistical transport (distance greater than 100 miles) a commercial trailer with a maximum height of 30 inches should be used. For commercial trucks with air ride suspension, trailer ballast is required for the air ride suspension to function properly. The amount of weight required will vary due to the helicopter's weight when configured for transport and the length of the trailer. Permits for highway transport and special routing may be required when the helicopter exceeds the legal height, width or length limits. Shipping units should contact the Unit Movement Officer or Installation Transportation Officer to obtain permits. Tiedown devices are to be secured tight enough to remove slack in the chain or strap. Overtightening will cause damage to the helicopter.

### D. Air Shipping

For air shipment, the center of gravity and exact weight must be computed for each helicopter so the center of gravity of the loaded aircraft can be determined. Incorrect balance locations or inaccurate shipping weights will endanger loaded helicopters, crew members and cargo. **Straps are not approved for air transport and should not be used. Use only MB-1 and MB-2 chains.**

## Approved Helicopter Tiedown Devices

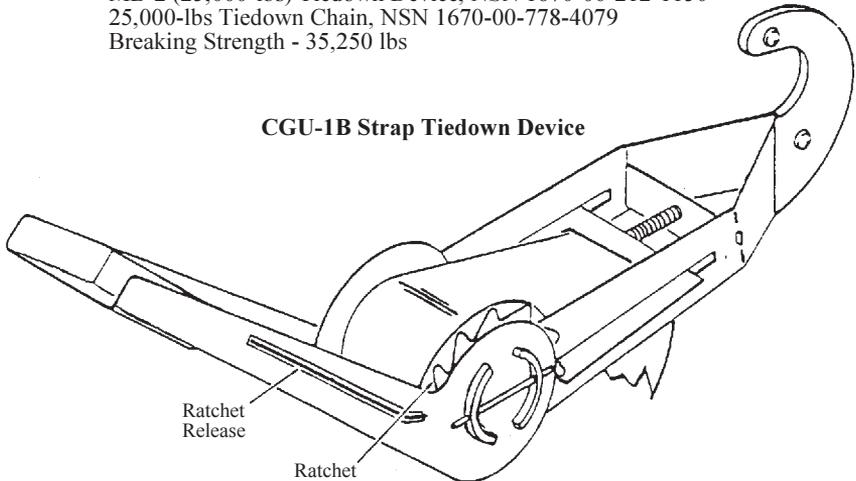
### MB-1 or MB-2 Chain Tiedown Device



MB-1 (10,000-lbs) Tiedown Device, NSN 1670-00-212-1149  
10,000-lbs Tiedown Chain, NSN 1670-00-516-8405  
Breaking Strength - 14,100 lbs

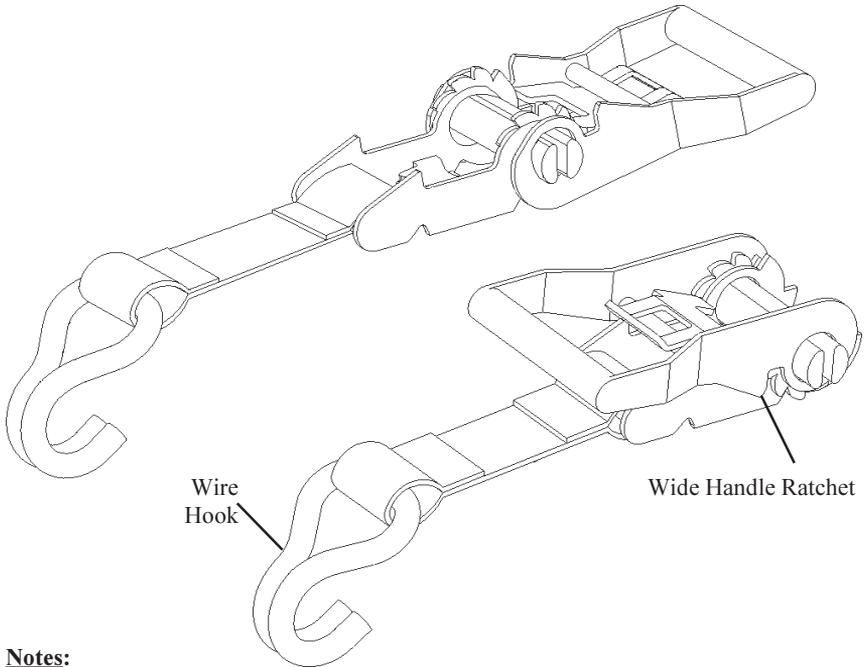
MB-2 (25,000-lbs) Tiedown Device, NSN 1670-00-212-1150  
25,000-lbs Tiedown Chain, NSN 1670-00-778-4079  
Breaking Strength - 35,250 lbs

### CGU-1B Strap Tiedown Device



CGU-1B (5,000 lbs) Tiedown Device  
NSN 1670-00-725-1437  
Manufacturer's Part Number: FE12687C240  
Breaking Strength - 6,000 lbs

## Commercial Polyester Straps with Hook (only for Marine and Highway Transport)



### Notes:

1. For U.S. straps, where the working load limit is printed on the label of the strap, the minimum breaking strength is 3 times the working load limit. For foreign straps, the breaking strength will usually be printed on the label of the strap. The working load limit marked on the strap should be used to determine the breaking strength of the strap.
2. Commercial polyester straps may be used in place of chains for marine and highway transport. Use straps with the required breaking strength as specified in the tiedown procedures for each helicopter.
3. Use straps with either the standard handle or wide handle ratchet, with wire hook end hardware. **Do not use the long AND wide handle ratchet devices.**

## Section VII. Intransit Care for Marine Shipments

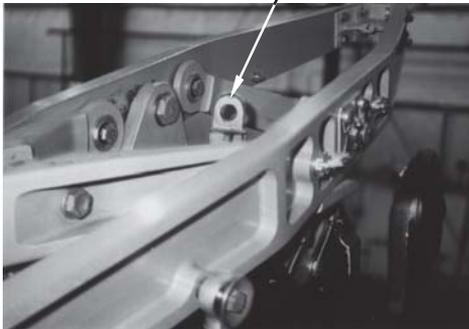
It is recommended that two aviation personnel accompany aircraft on vessel shipment to perform supercargo duties. Duties of the supercargo include the following:

- A. Providing security for aircraft.
- B. Inspecting heat shrink wrap covers daily for damage and repairing as necessary.
- C. Making repairs to shrink wrap and draining any condensation as required.
- D. Inspecting for fluid leaks - particularly fuel.
- E. Maintaining proper tiedown tension.
- F. Maintaining proper tire and strut inflations.
- G. Rigging helicopters and providing technical supervision for offloading.

# Notes

## Appendix A

### UH-1 Iroquois TM 55-1520-242-S

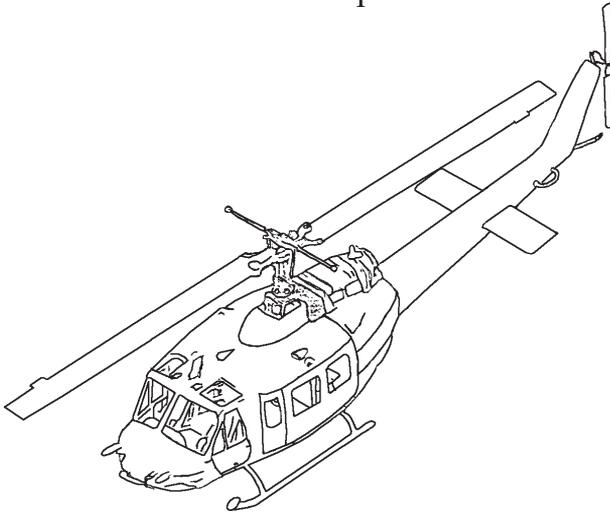


UH-1 Rotor head  
(for lifting)



UH-1 Tiedown ring attached  
to mooring point (4 locations)

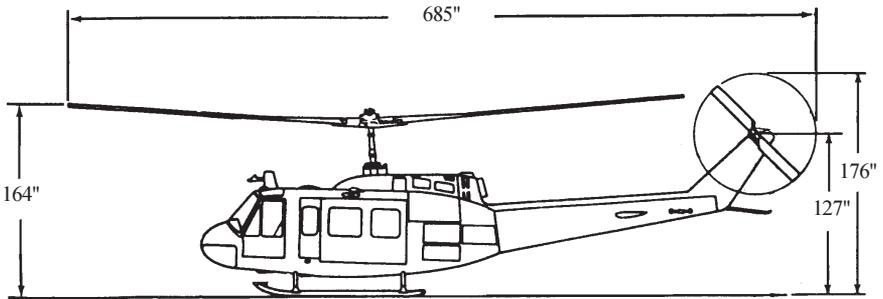
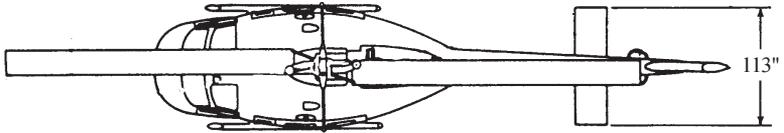
## UH-1 Helicopter



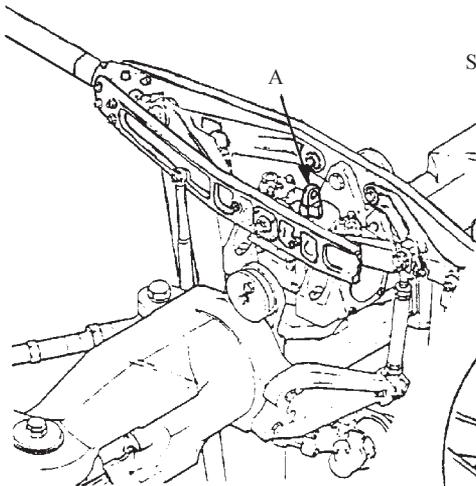
## Models UH-1D, EH-1D, UH-1H

Shipping Configuration	Length (in)	Width (in)	Height (in)	Weight (lbs)	Comments
Reduced for Sealift Operational	685	113	176	5,553 <sup>1</sup> 5,626 <sup>2</sup> 8,293 <sup>3</sup>	Blades fore/aft
Reduced for Sealift	538	113	164	5,348 <sup>1</sup> 5,421 <sup>2</sup> 8,088 <sup>3</sup>	Remove main rotor blades
Reduced for C-5 & C-17	538	113	127	5,143 <sup>1</sup> 5,216 <sup>2</sup> 7,883 <sup>3</sup>	Remove main rotor blades, rotor head, mast assembly, rotate rear rotor
1. UH-1D 2. UH-1H 3. EH-1H					

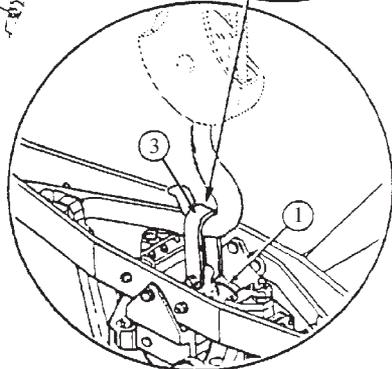
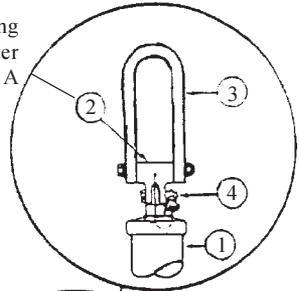
# UH-1H, Principal Dimensions



## Lifting the UH-1 Helicopter Using the Rotor Head and Hoisting Adapter



Hoisting Adapter  
See Detail A



### Hoisting Adapter

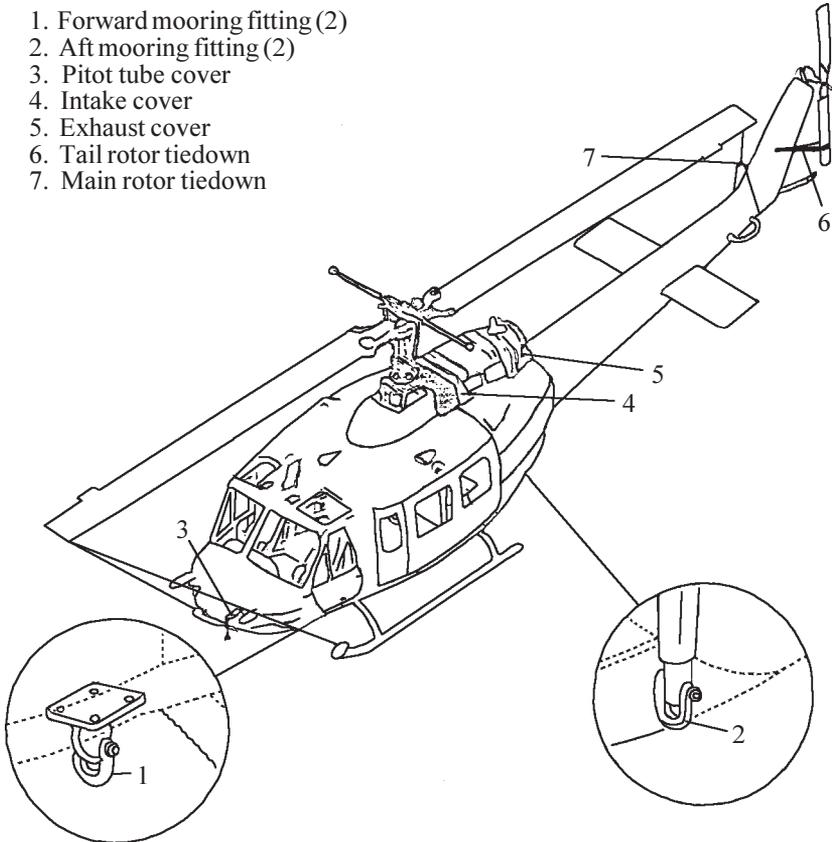
- 1 - Mast nut
- 2 - Clevis
- 3 - Strap
- 4 - Pin

Detail A

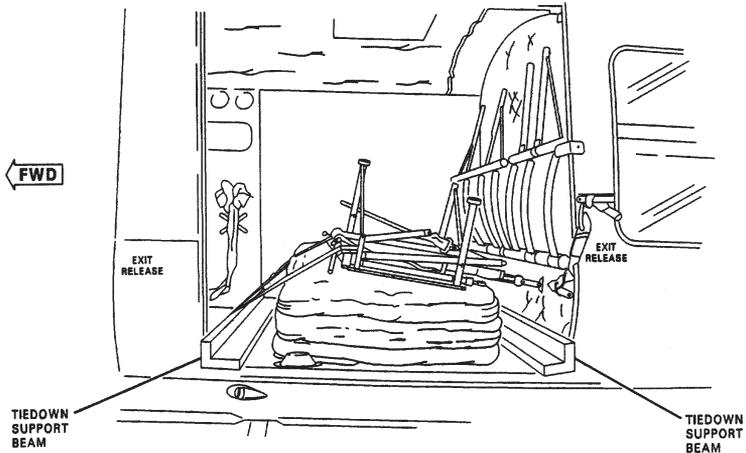
Attach hook to strap (3) portion of the hoisting adapter and lift helicopter

## UH-1 Helicopter

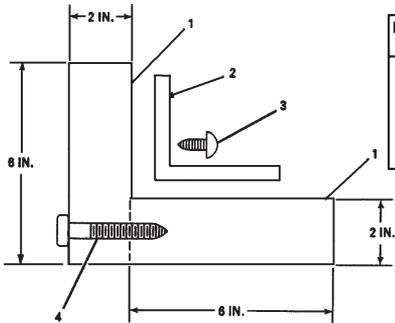
1. Forward mooring fitting (2)
2. Aft mooring fitting (2)
3. Pitot tube cover
4. Intake cover
5. Exhaust cover
6. Tail rotor tiedown
7. Main rotor tiedown



## Air Transport Tiedown Support Beams

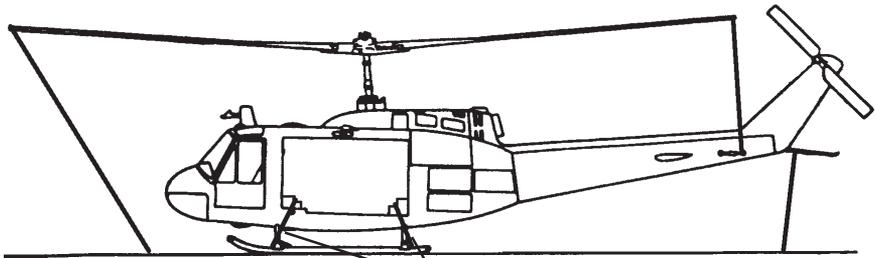
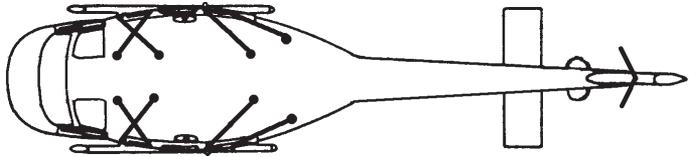


The UH-1 series helicopters lack the necessary structural hard points for securing them for 3G's of forward restraint. To compensate for this, the shipper must provide tiedown support beams for each helicopter. The tiedown support beams must be constructed as shown below.



INDEX NO.	MATERIALS	QUANTITY
1.	2 X 6 X 100 INCH LUMBER	4
2.	1-1/2 X 2-1/4 X 100 INCH ANGLE IRON OR EQUIVALENT, NSN 7125-00-577-5958	2
3.	ROUNDHEAD SCREW (1 INCH)	AS REQUIRED
4.	FLATHEAD SCREW (3 INCH)	AS REQUIRED

## UH-1 Tiedown for Air Transport with Tiedown Support Beams

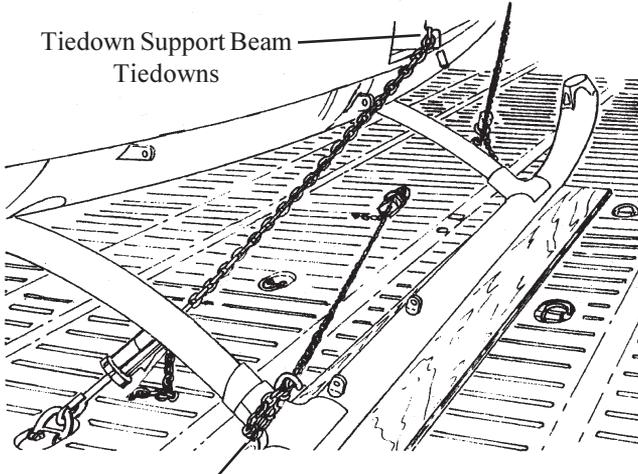


Tiedown support beam tiedowns (crosstube tiedowns are not shown in this view)

### Notes:

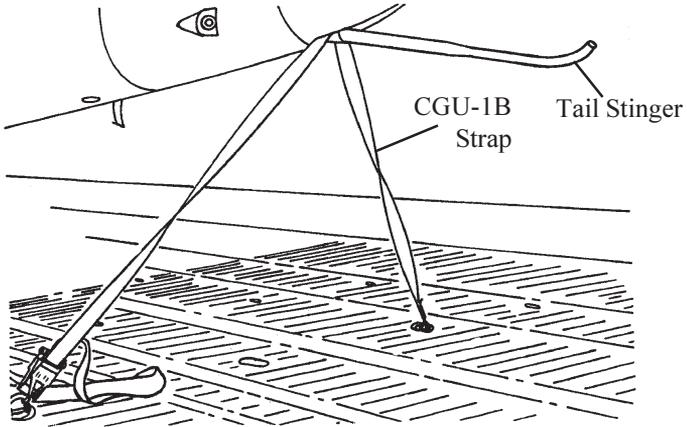
1. Prior to lowering the ground handling wheels, place 1/2-inch (minimum) plywood under helicopter skids.
2. Secure all tiedown devices at an angle between 30° and 60°, 45° is ideal. Use this tiedown configuration when the tiedown support beams shown on page A-6 can be used. It is the preferred tiedown configuration because of the lack of adequate forward restraint provided by the mooring fittings. If the support beams cannot be used, follow the tiedown configuration on page A-9.
3. Using four MB-1 tiedown chains, attach two MB-1 tiedown chains together (2 sets) and place through the fuselage over the tiedown support beams. Attach the ends of the chains to symmetrical cargo floor tiedown rings that are inboard of the fuselage, and forward and aft of the support beam.
4. Place four MB-1 chains around the lateral crosstubes and attach to selected aft tiedown rings.
5. Apply only enough tension to remove slack from the tiedown devices. Use a strap to secure the tail stinger. Place straps around the main rotor blades and attach to main rotor tiedown and a cargo floor tiedown ring (as shown) to prevent lateral blade movement.

## UH-1 Tiedown with Support Beams

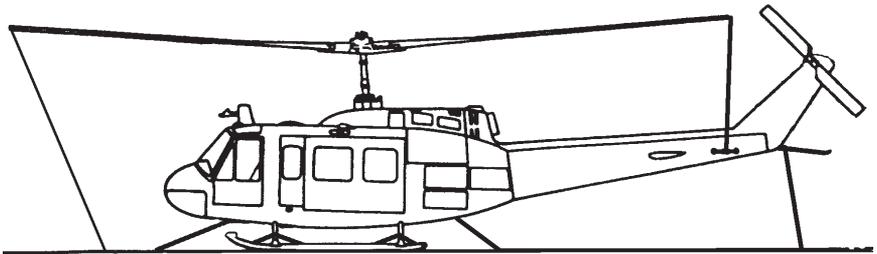
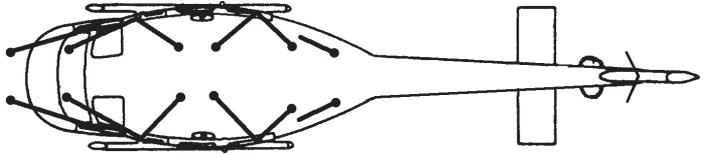


### Crosstube Tiedowns

Use protective material (not shown in drawing) to prevent chafing of crosstubes



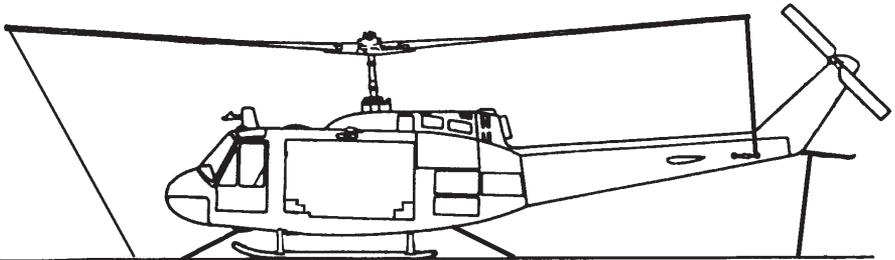
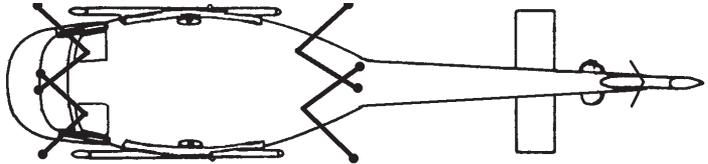
## UH-1 Alternate Tiedown for Air Transport (without tiedown support beams)



### Notes:

1. The following alternate tiedown method will be used on those helicopters on which tiedown support beams cannot be installed.
2. Prior to lowering the ground handling wheels, place 1/2-inch (minimum) plywood under helicopter skids.
3. Secure all tiedown devices at an angle between 30° and 60°, 45° is ideal.
4. Wrap four MB-1 chains around the aft crosstubes, ensuring that the arrangement of chains provides both forward and lateral restraint. Wrap four MB-1 chains around the forward crosstubes, ensuring that the arrangement provides aft and lateral restraint.
5. Connect four CGU-1B tiedown straps to the four mooring rings mounted on the bottom of the helicopter.
6. Apply only enough tension to remove slack from the tiedown devices. Use a strap to secure the tail stinger. Place straps around the main rotor blades and attach to the main rotor tiedown and a cargo floor tiedown ring (as shown) to prevent lateral blade movement.

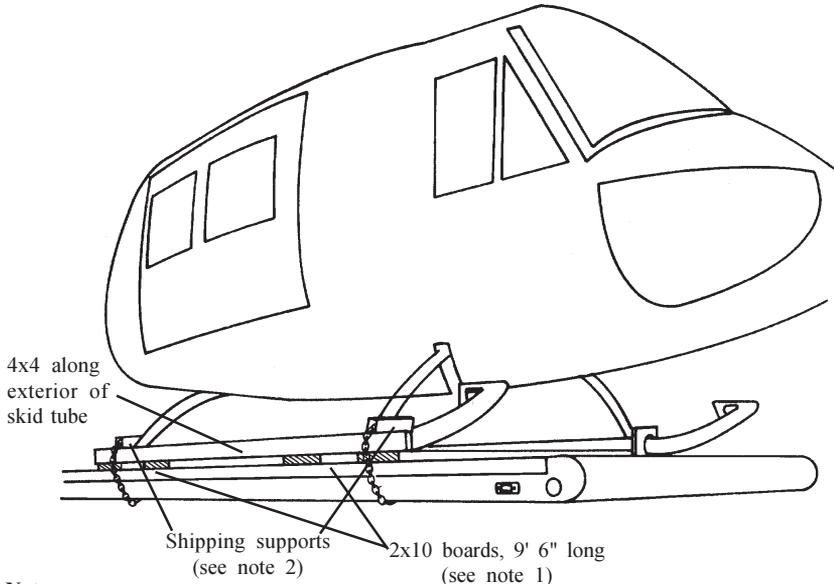
## UH-1 Tiedown for Marine and Highway Transport



### Notes:

1. Secure all tiedown devices at an angle between 30° and 60°, 45° is ideal.
2. Attach two MB-1 chains or polyester straps with a minimum breaking strength of 10,000 lbs to each forward and aft mooring points. For U.S. straps, where the working load limit is printed on the label of the strap, the minimum breaking strength is 3 times the working load limit. For foreign straps, the breaking strength will usually be printed on the label of the strap.
3. Apply only enough tension to remove slack from the tiedown devices.
4. Use individual chains or straps for each line (8 req'd). Do not run tiedowns through the helicopter tiedown points.
5. Use a strap to secure the tail stinger. Place straps around the main rotor blades and attach to the main rotor tiedown and a cargo floor tiedown ring (as shown) to prevent lateral blade movement.
6. See page A-11 for additional information on highway transport.

## UH-1 Shipping Supports for Highway Transport



### Notes:

1. Prior to loading, secure six 2x10 boards, 9' 6" long, to the floor of the flatbed. Three boards should be placed adjacent to each other and across the flatbed to support the aft skid saddle. The other three boards are placed adjacent to each other and across the flatbed to support the forward skid saddle. In the drawing above, the 2x10 boards are cross-hatched for clarity.
2. Install shipping supports over skid tubes forward and aft of skid saddles.
3. Place a 4x4 along the exterior of each skid tube and secure to prevent movement during shipment.
4. Secure landing gear skid tubes to flatbed with chains mounted over shipping supports as shown above.
5. Tiedown fuselage as shown on page A-10.

# Appendix B

## CH-47 Chinook

TM1-1520-241-S

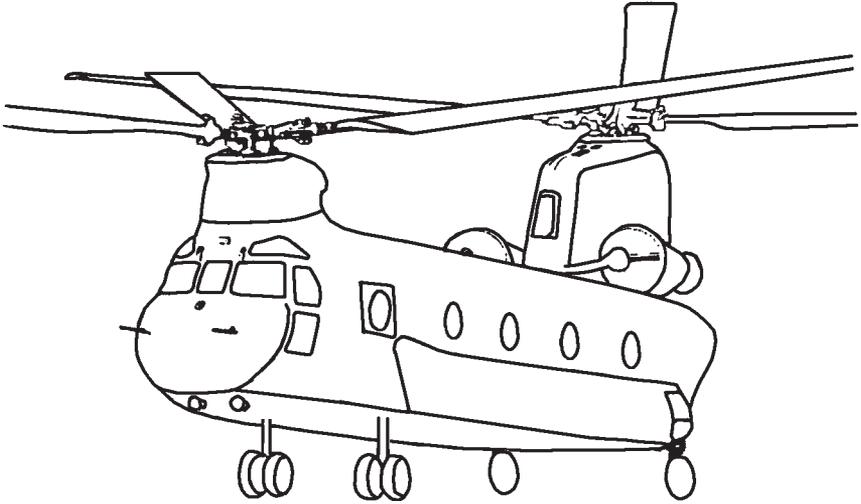


CH-47 Aft tiedown fitting



CH-47 Forward tiedown fitting

## CH-47D/F Helicopter



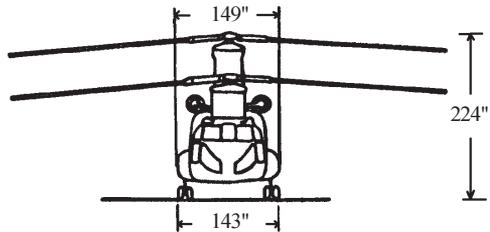
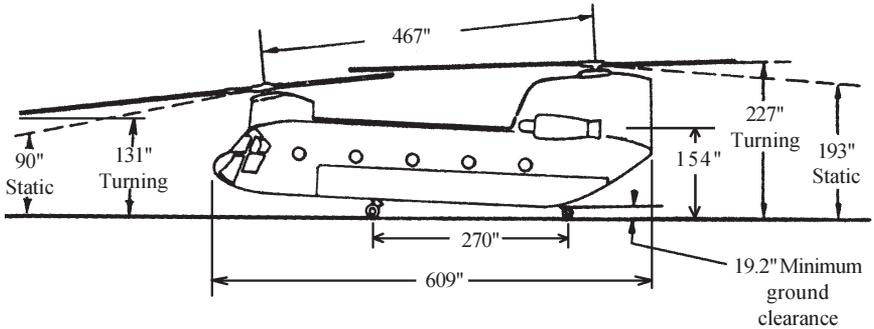
Shipping Configuration	Length (in)	Width (in)	Height (in)	Weight (lbs)	Comments
Reduced for Sealift	609	149	224	33,000 <sup>1</sup>	Remove blades <sup>2,3</sup>
Reduced for C-5 & C-17	609	149	154	33,000 <sup>1</sup>	Remove blades, fwd and aft transmission packages, and aft pylon <sup>2,3</sup>

1. Maximum shipping weight.

2. For the CH-47D, store all removed items except the aft pylon inside the helicopter.

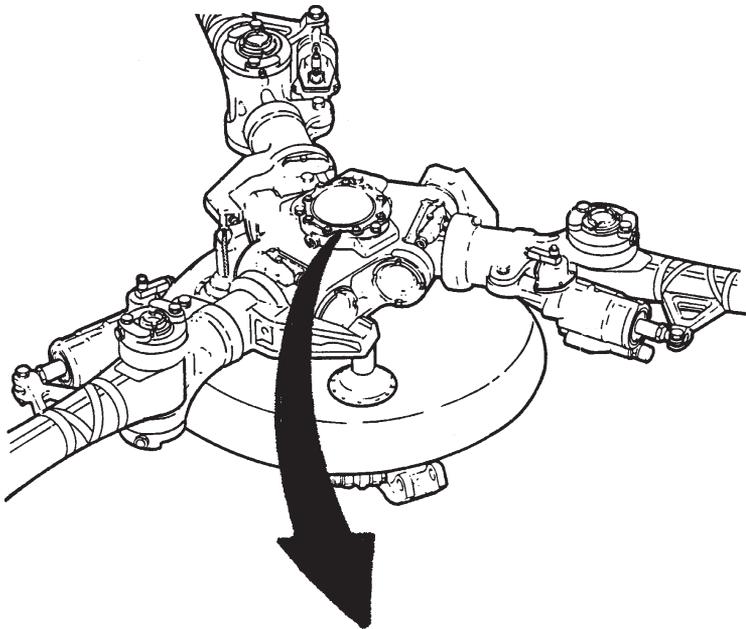
3. For the CH-47F, store all removed items except the aft pylon/aft transmission assembly inside the helicopter. The aft pylon/aft transmission assembly is removed as one unit.

# CH-47D/F Principal Dimensions



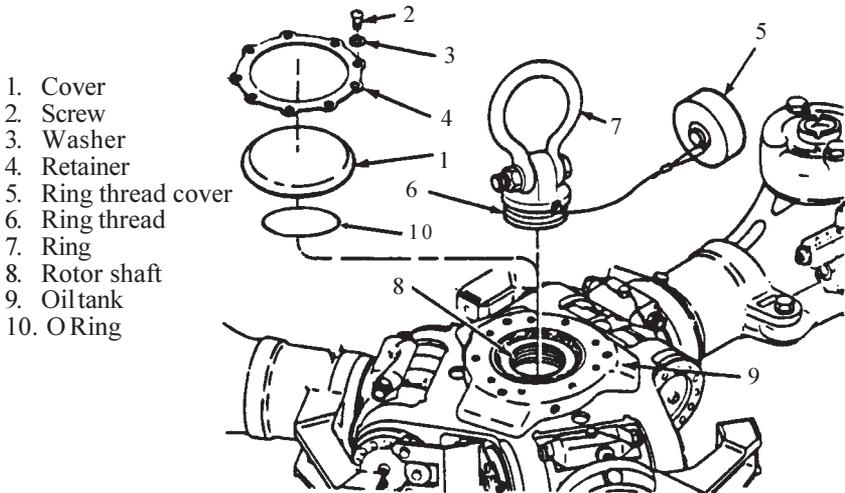
# CH-47 Rotor Head

Forward Head shown, aft head similar



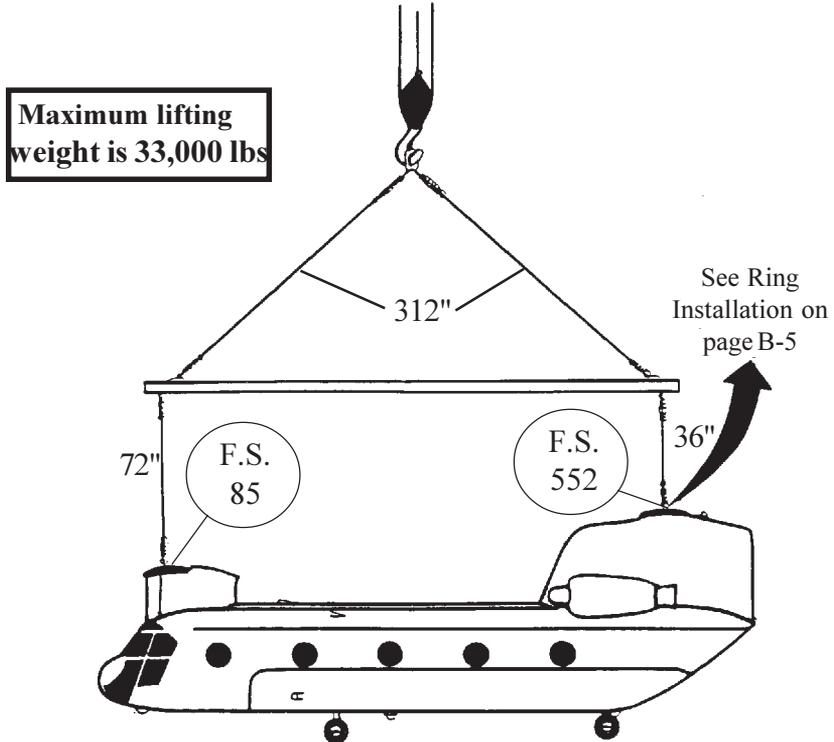
See next page for  
lifting ring assembly

## Ring Installation for Lifting



Required Items for Lifting	Part Number	NSN
Aircraft Sling Set (incl spreader bar)	1730-CH47-001-24	1730-00-504-9356
Hoisting adapter/ring assembly (for fwd shaft and aft rotor shaft)	114E5909-8	1730-00-010-7462
Towing Bridle Assembly	145G0332-5	

## CH-47 Lifting Guidance (using a single-point crane lift)

**Notes:**

1. Inspect hoisting adapters for thread damage. Fully screw hoisting adapter into shaft. A minimum engagement of eight threads is required.
2. Attach hoisting slings to forward and aft rotor shafts with two hoisting adapters. If the aircraft sling set listed in the table on page B-5 is not available, use a spreader bar with a capacity of at least 33,000 lbs and 442 in. (36' 10") in length, and sling lengths as shown in the figure above.

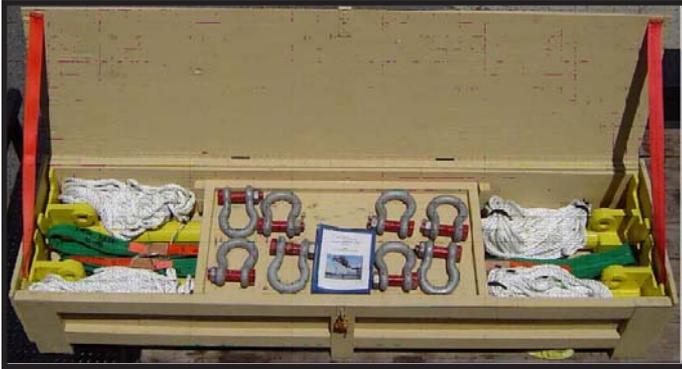
## CH-47 Lifting Guidance (using a BHLB47 Lifting Assembly)

The BHLB47 helicopter lifting assembly is used to adapt a standard 40-foot container spreader to lift CH-47 series helicopters aboard ships for deployment. Although, the BHLB47 assembly can handle helicopters up to 40,000 pounds, the maximum lifting weight for the CH-47 is 33,000 pounds. The lifting assembly works with cranes equipped with automatic adjustable container spreaders, and standard container spreaders.

### Parts List for BHLB47 Lifting Assembly

Description	Part Number	Quantity
Shipping/Storage Box	BHLB47-1	1
Operators Manual	BHLB47-2	1
Lifting Spreader	BHLB47-3	2
8' x 15,000 lb. High-Performance Synthetic Sling	BHLB47-4	4
7' x 20,000 lb. High-Performance Synthetic Sling (for forward rotor head)	BHLB47-5	1
4' x 20,000 lb. High-Performance Synthetic Sling (for aft rotor head)	BHLB47-6	1
1-3/8" Safety Shackle	BHLB47-7	8
Tagline, 5/8" diameter, 3-part, nylon, 100 feet long	BHLB47-8	4

## CH-47 Lifting Guidance (using a BHLB47 Lifting Assembly)



BHLB47 Lifting Assembly in Box



Lifting Spreader, BHLB47-3



High Performance Synthetic Sling  
BHLB47-4, BHLB47-5, BHLB47-6



Safety Shackle  
BHLB47-7



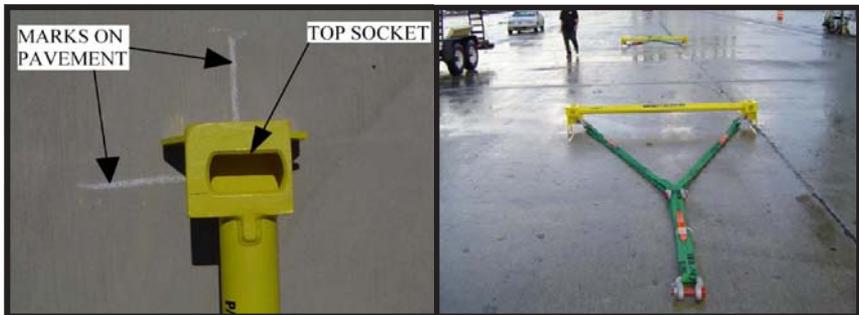
Tagline, BHLB47-8

## Setup and Installation for the BHLB47 Lifting Assembly

Step #1 - If using an automatic, adjustable container spreader, measure the width between the legs of the gantry through which the helicopter must pass. If this width is less than 60 feet, use a standard container spreader to lift the helicopter. Attach tag lines, BHLB47-8, to both corners on one long side of the standard spreader.

Step #2 - If using an automatic, adjustable container spreader, set it to the standard 40-foot container position (ISO standard 1A position). If using a manual lifter, ensure it is designed for a standard 40-foot container (ISO standard 1A size). Lower the container spreader and mark the position of the twist-locks on the pavement.

Step #3 - Place the lifting spreaders, BHLB47-3, with the top sockets aligned with the marks on the pavement made in step #2 (see below). The pointer arrows marked on the lifting spreaders must be facing each other. Assemble shackles and slings to the lifting spreaders as shown on the drawing on page B-10. Extend slings outward from ends of the container lifter as shown below.

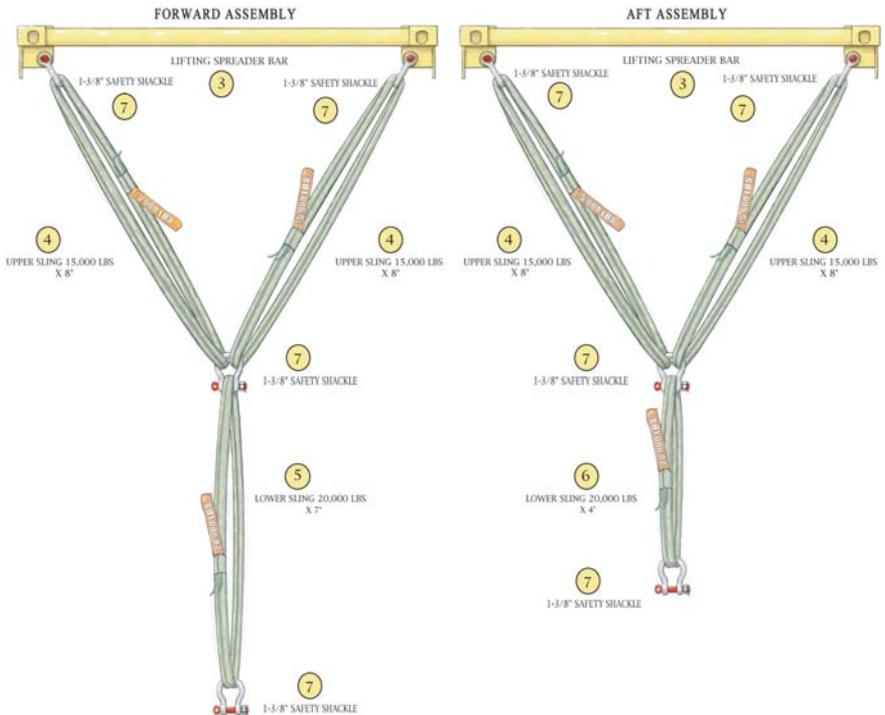


Step #4 - Lower the container spreader until the twist-locks engage the sockets on top of the lifting spreaders. Verify that the twist-locks have rotated into the locked position by looking through the openings of the spreader lock boxes. See photos on page B-11.

Step #5 - Slowly raise the container spreader and watch the slings as they hang vertically from the spreader. The slings should lie over the shackle pins or in the bow of the shackles without being twisted, folded, or overlapped.

Step #6 - Attach the 7-foot sling to the forward rotor hub and the 4-foot sling to the aft rotor hub. Lift the helicopter as shown on page B-12.

## Shackle and High-Performance Synthetic Sling Setup



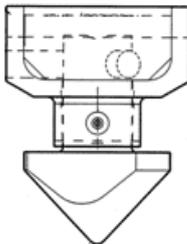
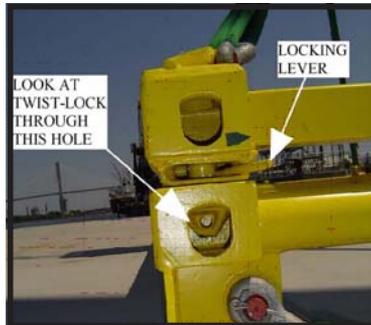
### Twist-locks engaged in spreader sockets



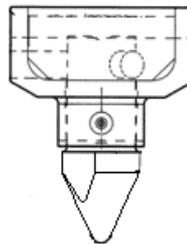
Automatic, Adjustable Container Lifter



Standard Container Lifter



Locked Position



Unlocked Position

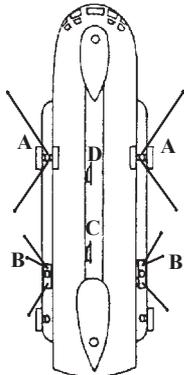
## Lifting the CH-47 with the BHLB47 Lifting Assembly



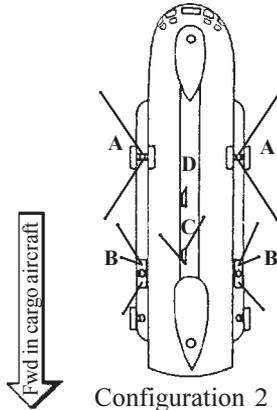
### **Notes:**

1. When using the standard spreader with the BHLB47 lifting assembly, attach taglines, BHLB47-8, to the forward and aft tiedown points on the side of the aircraft opposite the taglines on the spreader.
2. There must be one person handling each tagline on the dock and aboard the ship during lifting to control the rotation of the aircraft. Failure to do this may result in damage to the aircraft, surrounding equipment, and personnel.

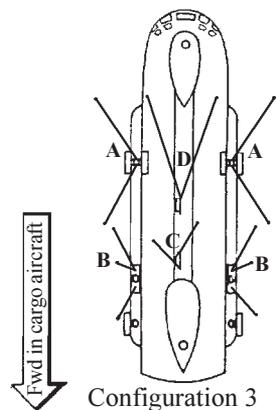
## CH-47 Tiedown for Air Transport (C-5 and C-17) (Nose facing aft)



Configuration 1



Configuration 2



Configuration 3

### Tiedown Points:

- A - Forward landing gear rings
- B - Jack adapter rings
- C - Reversed forward cargo hook
- D - Reversed center cargo hook

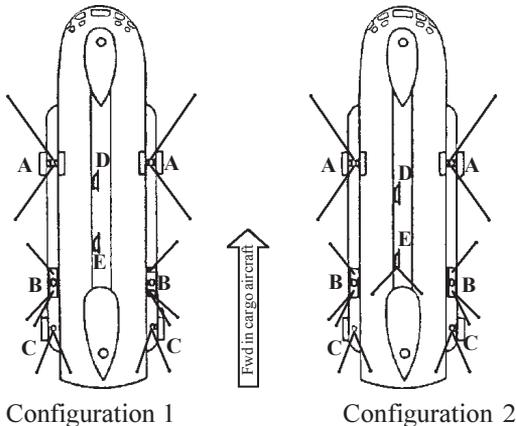
### Configuration:

- 1) No cargo hooks (forward or center)  
Maximum shipping weight - 22,000 lbs  
Maximum tire pressure - 126 psi  
10 tiedown chains required
- 2) Reversed center cargo hook used  
Maximum shipping weight - 33,000 lbs  
Maximum tire pressure - 126 psi  
12 tiedown chains required
- 3) Reversed center and forward cargo hook  
Maximum shipping weight - 35,520 lbs  
Maximum tire pressure - 126 psi  
14 tiedown chains required

### Note:

Use only MB-2 tiedown devices. Do not run chains through the tiedown provisions. Attach tiedown hooks directly to the provision.

## CH-47 Tiedown for Air Transport (C-5 only) (Nose facing forward)



Configuration 1

Configuration 2

### Tiedown Points:

- A - Forward landing gear rings
- B - Jack adapter rings
- C - Aft landing gear rings
- D - Forward cargo hook
- E - Center cargo hook

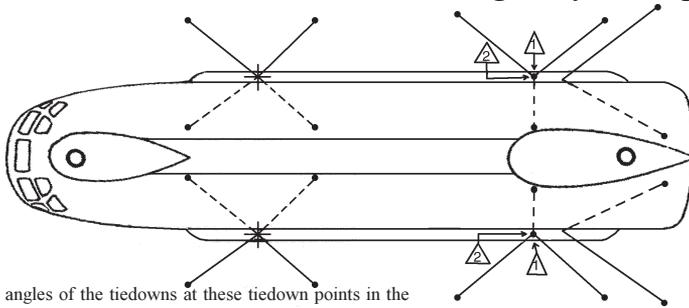
### Configuration:

- 1) No cargo hooks (forward or center)  
Maximum shipping weight - 33,000 lbs  
Maximum tire pressure - 126 psi  
14 tiedown chains required
- 2) Center cargo hook used  
Maximum shipping weight - 35,520 lbs  
Maximum tire pressure - 126 psi  
16 tiedown chains required

### Notes:

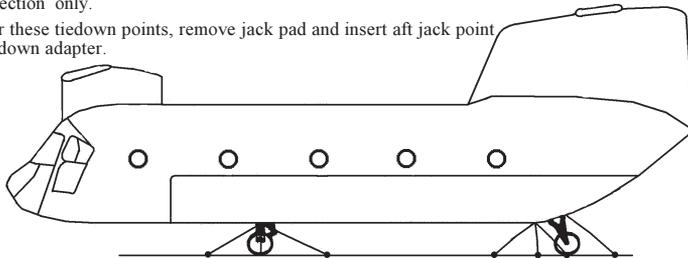
1. Use only MB-2 tiedown devices for securing CH-47 helicopters. Do not run chains through tiedown provisions, attach tiedown hooks directly to the provision.
2. The aft landing gear rings must be used only for forward restraint. Chains shall not be wrapped around the rear landing gear.

## CH-47 Tiedown for Marine and Highway Transport



△ The angles of the tiedowns at these tiedown points in the longitudinal and lateral directions must balance each other out such that the resultant tiedown load will be in the vertical direction only.

△ For these tiedown points, remove jack pad and insert aft jack point tiedown adapter.



### Notes:

1. Secure all tiedown devices at angles between  $30^\circ$  and  $60^\circ$ ,  $45^\circ$  is the ideal.
2. Use only MB-1 or MB-2 chains, or polyester straps with a breaking strength of at least 15,000 lbs. For U.S. straps, where the working load limit is printed on the label of the strap, the minimum breaking strength is 3 times the working load limit. For foreign straps, the breaking strength will usually be printed on the label of the strap.
3. Use individual chains or straps for each tiedown line shown above (16 req'd).
4. Apply only enough tension to remove slack from the tiedown devices.
5. Pad the strut to prevent chafing.

# Appendix C

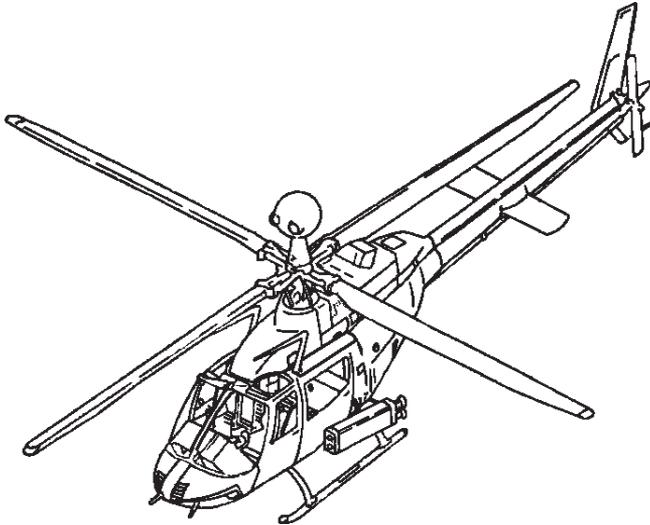
## OH-58 Kiowa Warrior

TM 1-1520-248-S



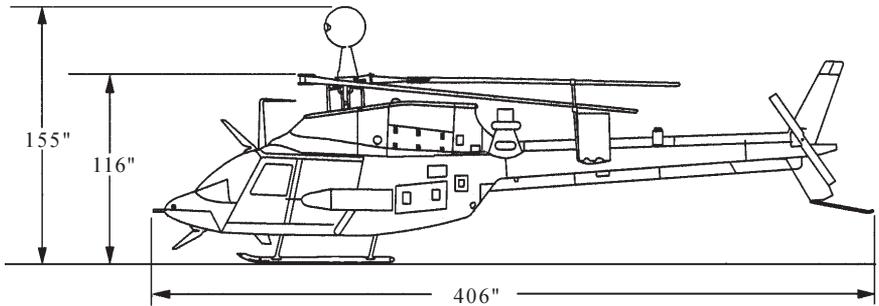
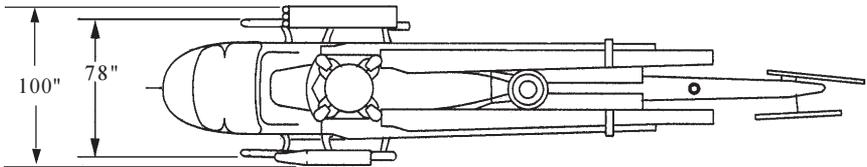
OH-58 tiedown shackle for forward and aft jack pad fittings

## OH-58D Helicopter



Shipping Configuration	Length (in)	Width (in)	Height (in)	Weight (lbs)	Comments
Reduced for Sealift Operational, C-5 (front load only), C-17 (aft of wing box)	406	100	155	3,188	Fold rotor blades, fold Universal Weapons Pylons (UWPs) & horizontal stabilizer
Reduced for Sealift, C-5 (rear load), C-17 (wing box and forward)	406	100	116	2,988	All of above plus remove mast mounted sight
Reduced for C-130	408	100	106	3,110	All of above plus remove standard landing gear skids and install 406-706-209 transport kit and kneel or kneel Rapid Deployment Landing Gear, remove lower wire cutter, & UHF antenna, rotate vertical fin

# OH-58D Principal Dimensions



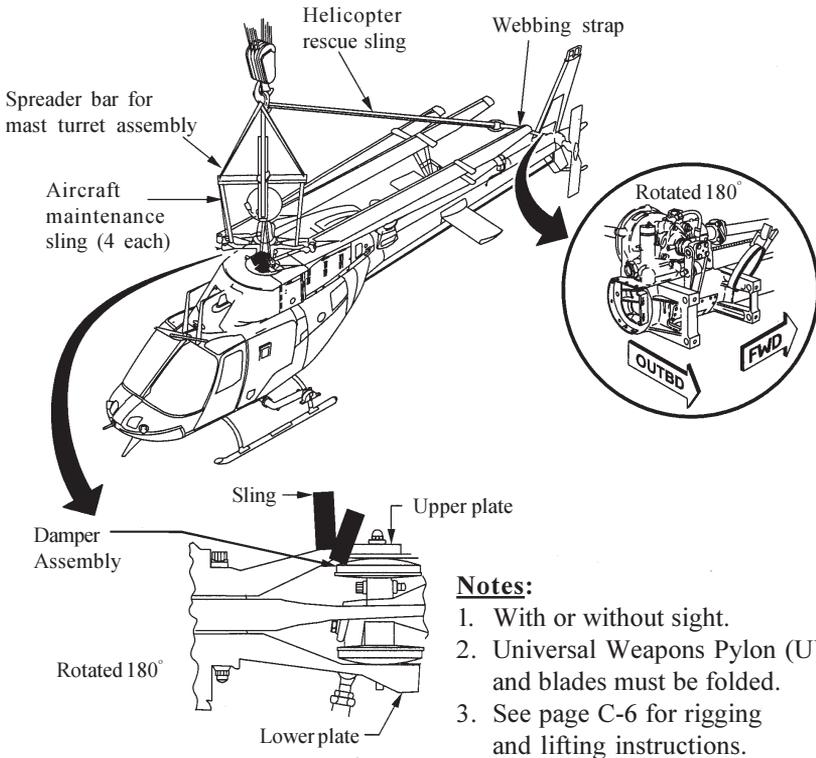
## OH-58D Blade folding bracket



## OH-58D Lifting Guidance for Marine Transport

### CAUTION

To prevent spreader bar from damaging the mast turret assembly or helicopter, ensure helicopter weight is firmly on gear and spreader bar assembly is supported away from top of mast turret assembly before disconnecting sling.



### **Notes:**

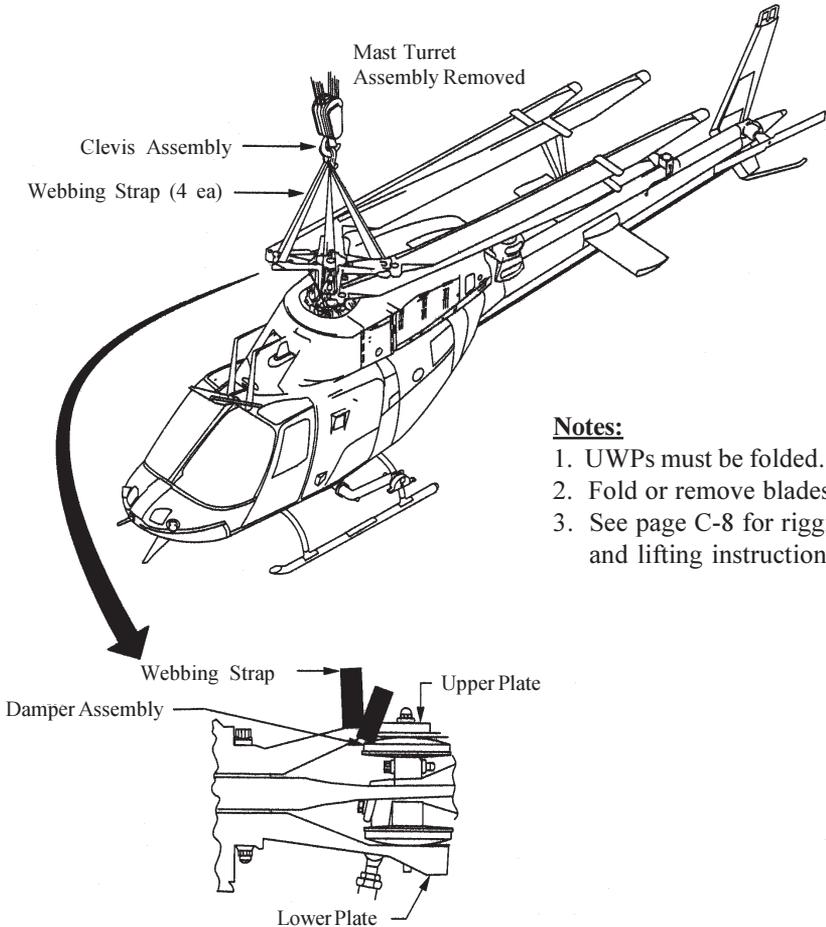
1. With or without sight.
2. Universal Weapons Pylon (UWP) and blades must be folded.
3. See page C-6 for rigging and lifting instructions.

## OH-58D Lifting Guidance for Marine Transport (cont)

### **Rigging and Lifting Instructions:**

1. Attach the ends of the four upper slings attached to the spreader bar.
2. Attach one end of the helicopter rescue sling to the spreader bar.
3. Secure retaining pin in clevis with bolt and nut.
4. Place clevis in hook of dockside or shipboard crane.
5. Position spreader bar centered directly over mast mounted sight.
6. Attach one end of aircraft maintenance sling to clevis on spreader bar. Pass other end of sling down through upper yoke of main rotor hub and back up to the same clevis on spreader bar and secure clevis.
7. Repeat #6 for the three remaining spreader bar legs.
8. Pass webbing strap through forward mount of vertical stabilizer and through free end of the helicopter rescue sling attached to clevis.
9. Secure ends of webbing strap together and remove slack.
10. Remove ground handling wheels and tow bar.
11. Lift helicopter onto the ship and down through the hold to lower deck.
12. Stabilize helicopter with tag lines as it is being lifted and lowered to prevent it from striking the ship structure.

## OH-58D Lifting Guidance for Highway Transport (using the Aerial Recovery Kit)

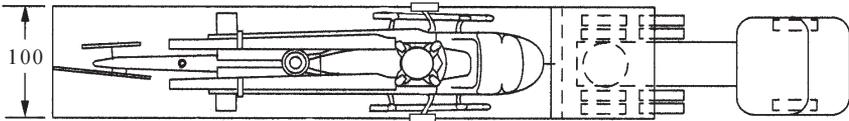


## OH-58D Lifting Guidance for Highway Transport (cont)

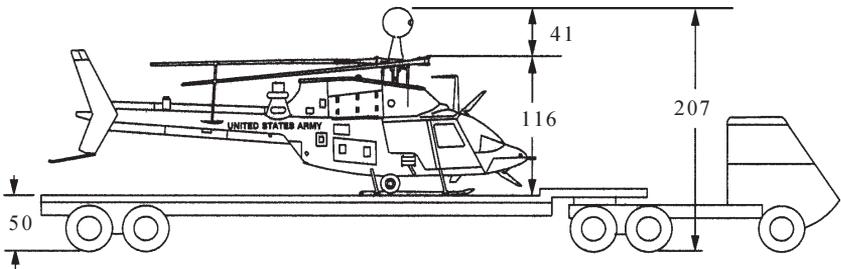
### **Rigging and Lifting Instructions:**

1. Align transport trailer for loading. Position trailer to the rear of and in line with the helicopter. The rear end of the trailer should be approximately 15 feet to the rear of the helicopter tail.
2. Install webbing strap.
  - a. Place one end of strap through clevis assembly. Pass other end of strap under upper main rotor yoke and back to lifting clevis.
  - b. Repeat for three more straps.
  - c. Secure lifting eye clevis with attaching hardware (screw pin).
3. Attach 25-foot fibrous ropes to front and aft crosstubes to guide helicopter during hoisting.
4. Add ballast to cockpit area as necessary to maintain helicopter in a level attitude during lifting.
5. During hoisting operations, remain clear of helicopter at all times.
6. Insert crane hook into clevis assembly of helicopter sling.
7. Slowly hoist helicopter to a height approximately 1-foot higher than the trailer.
8. Back trailer under helicopter. To prevent structural damage to helicopter, use care to provide adequate clearance when backing trailer under helicopter.
9. Lower helicopter onto trailer. Use tag lines to keep helicopter parallel with trailer center line.
10. Position helicopter on semitrailer (see page C-9 and C-10).

## Loading Diagram for M270A1 Military Tactical Transport Semitrailer



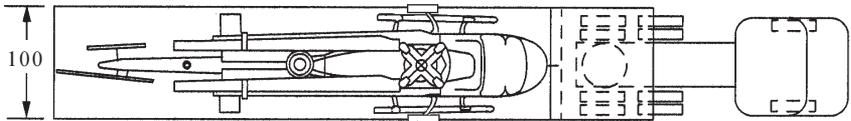
**NOTE:** The UWPs will extend beyond the width of the trailer by 1-1/2 inches on each side



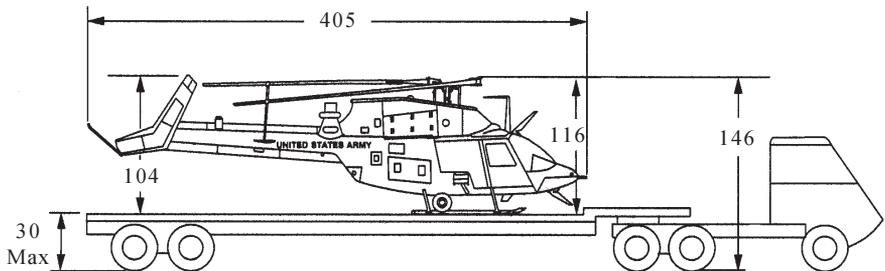
**NOTE:** Secure all blades in blade rack.

**All dimensions are in inches**

## Loading Diagram for Commercial Air-Ride Tractor and Lowboy Semitrailer



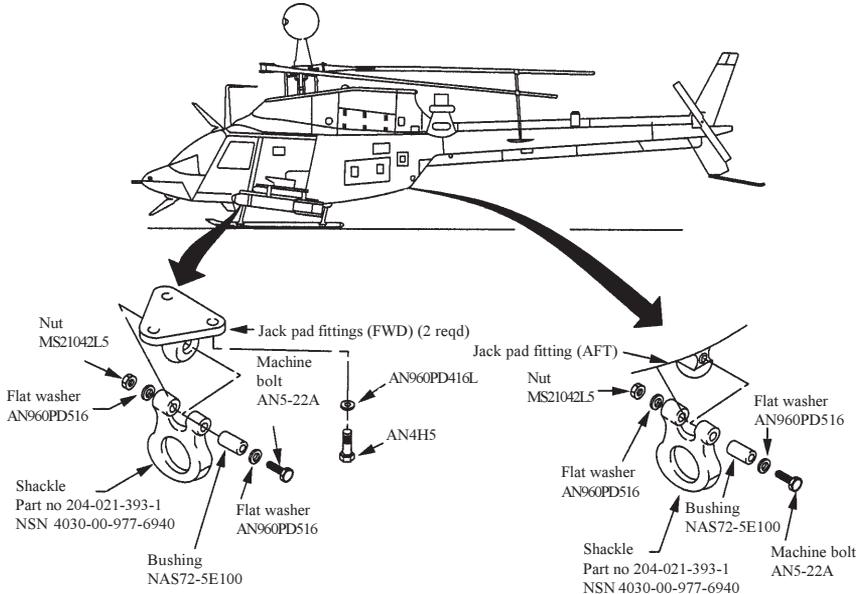
**NOTE:** The UWPs will extend beyond the width of the trailer by 1-1/2 inches on each side



**NOTE:** Secure all blades in blade rack.

**All dimensions are in inches**

## Installation of Jack Pad Fitting Tiedown Shackles (Standard Landing Gear)



### **Notes:**

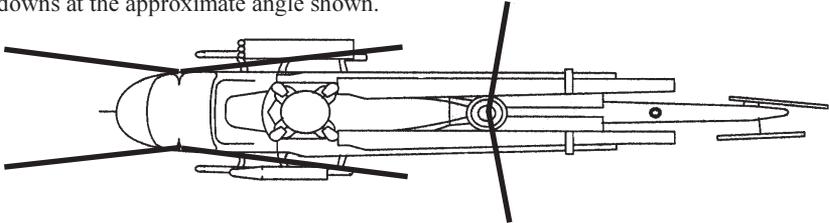
1. Prior to tiedown, install forward and aft jack pad fitting tiedown shackles with machine bolts and flat washers as shown.
2. The strength of these fittings is extremely limited, especially when pulling away from the fuselage. Maximum allowable tension in the chains or straps is 764 and 1,470 lbs on the forward and aft jack pad fittings, respectively.
3. Tighten MB-1 chain adjusters or strap ratchets just enough to take out slack.
4. When using straps, use only one person to tighten straps with standard (short or wide) ratchet handles. Do not use long and wide handles.
5. Do not use straps in a loop configuration.

## OH-58D Tiedown for Marine Transport (Standard Landing Gear)

Because of the low strength of the jack pad fittings, the OH-58D helicopter requires a total of 11 tiedowns (use both jack pad fitting and crosstube tiedowns). Only use this tiedown configuration with helicopters that have standard landing gear.

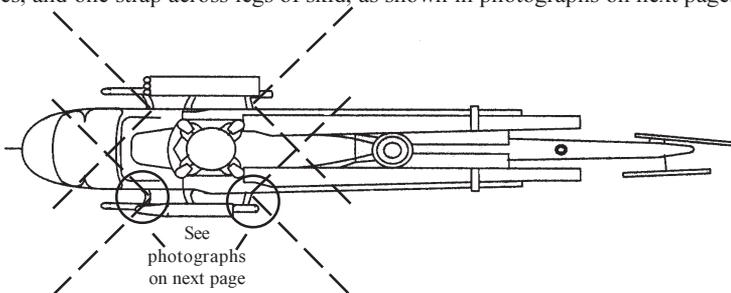
### Jack Pad Fitting Tiedowns (6 required)

Use six individual MB-1 chains, CGU-1B or polyester straps with a breaking strength of 5,000 or 6,000 pounds. For U.S. straps, where the working load limit is printed on the label of the strap, the minimum breaking strength is 3 times the working load limit. For foreign straps, the breaking strength will usually be printed on the label of the strap. Attach each chain or strap directly to the shackle. Do not run through the shackle. Attach tiedowns at the approximate angle shown.



### Crosstube Tiedowns (4 required) and Skid Connecting Strap (1 required)

Use CGU-1B or polyester straps with a breaking strength of 5,000 or 6,000 pounds. For U.S. straps, where the working load limit is printed on the label of the strap, the minimum breaking strength is 3 times the working load limit. For foreign straps, the breaking strength will usually be printed on the label of the strap. Wrap four straps around crosstubes, and one strap across legs of skid, as shown in photographs on next page.



## OH-58D Crosstube Tiedowns and Skid Connecting Strap for Marine Transport (Standard Landing Gear)



**Front crosstube:** Wrap straps (CGU-1B or polyester straps with a breaking strength of 5,000 or 6,000 lbs) around crosstube inside of where the fuselage mounts to the skids.

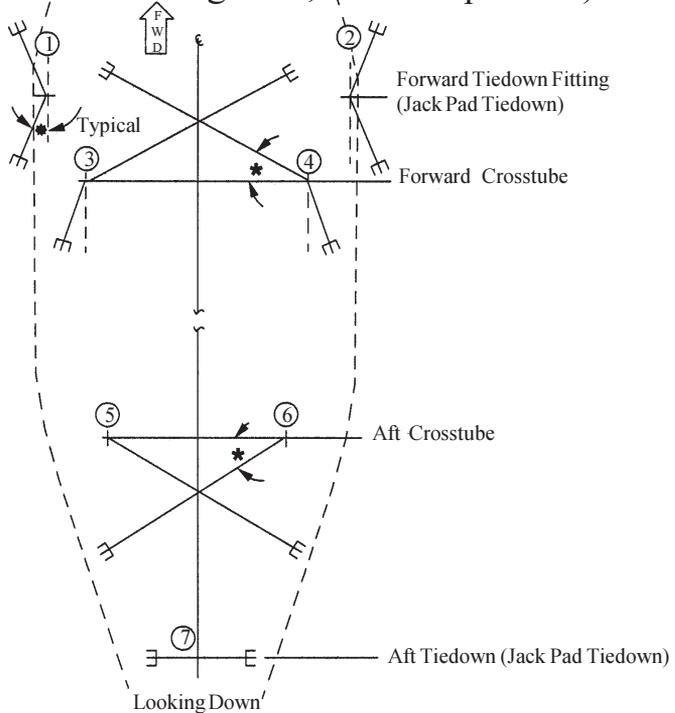
### Crosstube Tiedowns

**Aft crosstube:** Wrap strap (CGU-1B or polyester strap with a breaking strength of 5,000 or 6,000 lbs) around crosstube as close to the outboard side or the fuselage mounts as possible. In addition to the aft crosstube straps, use a strap to connect the skid tubes just forward of the crosstube saddles and jack pad fittings.



### Skid Connecting Strap

## OH-58D Tiedown for Air and Highway Transport (Standard Landing Gear, No Transport Kit)



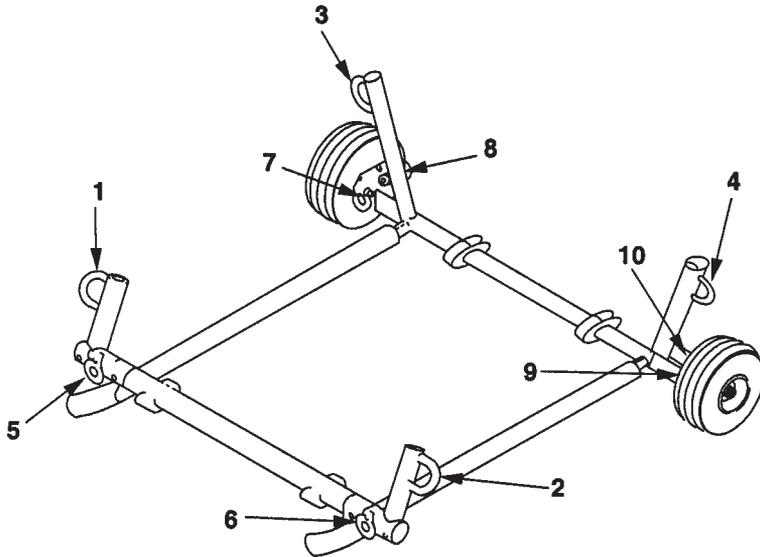
### Note

- \* = 10° to 30° for points ① ② ③ ④ and ⑦
- \* = 30° to 60° for points ③ ④ ⑤ and ⑥

### **Note:**

Use only MB-1 chains for air transport. MB-1 chains, CGU-1B or polyester straps with a breaking strength of 5,000 or 6,000 lbs can be used for highway transport. For U.S. straps, where the working load limit is printed on the label of the strap, the minimum breaking strength is 3 times the working load limit. For foreign straps, the breaking strength will usually be printed on the label of the strap. Attach each chain or strap directly to the shackle on the jack pad tiedowns. Do not run through the shackle. Attach tiedowns at the approximate angle shown. Attach skid connecting strap as shown on page C-13.

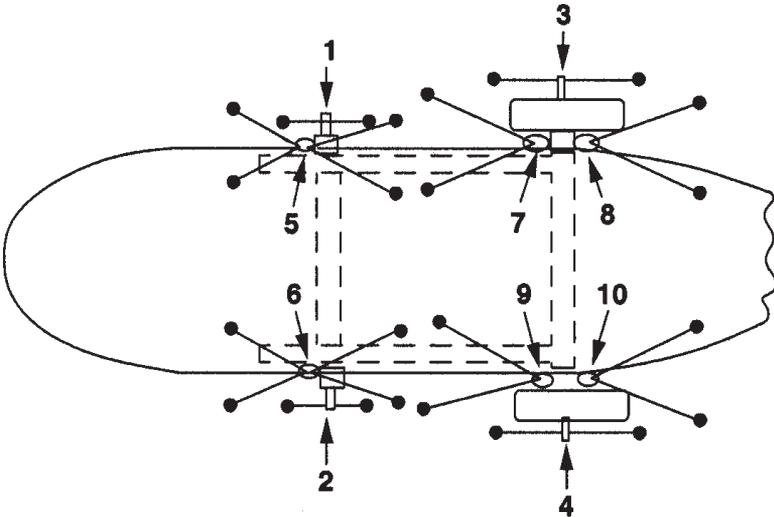
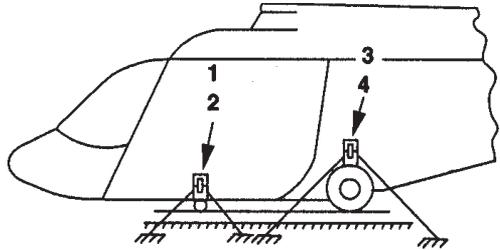
## OH-58D Standard Landing Gear, Transportability Kit

**Notes:**

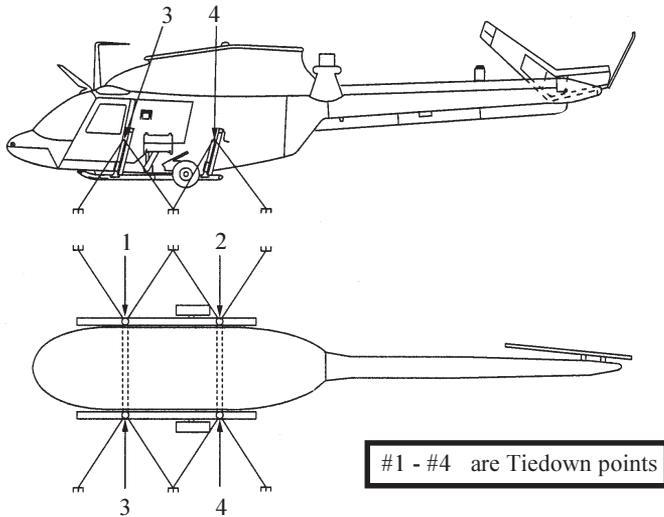
1. Numbers 1 through 4 are tiedown points. The maximum vertical load on the tiedown points is 4,127 lbs. One strap or chain is required at each of these points. The chain or strap must pass through the tiedown point. No attachment is permitted. The chain or strap must be secured at two points, one forward of tiedown point and one aft of it. See page C-16.
2. Numbers 5 through 10 are tiedown shackles. The maximum forward, aft and lateral allowable load on the tiedown shackles is 4,500 lbs. Attach chains or straps to tiedown shackles as shown on page C-16
3. The tiedown loads are based on a maximum gross weight of 3,814 lbs.

# OH-58D Tiedown for Air, Marine, and Highway Transport (Standard Landing Gear, Transportability Kit Installed)

**Note:** Only tiedowns for points 1-4 are shown in this view



## OH-58D Tiedown for Air, Marine, and Highway Transport (Rapid Deployment Landing Gear)



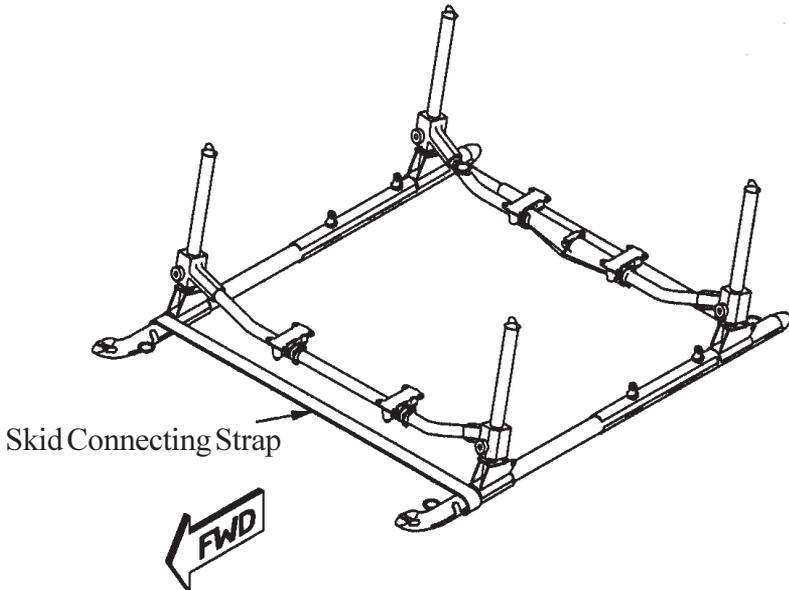
**Note:** Use MB-1 chains or polyester straps with a breaking strength of 10,000 lbs. For U.S. straps, where the working load limit is printed on the label of the strap, the minimum breaking strength is 3 times the working load limit. For foreign straps, the breaking strength will usually be printed on the label of the strap. Attach each chain or strap directly to tiedowns. Do not run through the tiedown. Attach two chains or straps at the approximate angle shown (8 reqd). Wrap one strap around the arm of each universal weapons pylon (UWP). Attach one strap to the skids to prevent them from spreading during transport. See page C-18 and C-19 for information on the UWP tiedowns and skid connecting strap, respectively.

## OH-58D Tiedown for Air, Marine, and Highway Transport (Rapid Deployment Landing Gear)

Poylester strap wrapped around arm of Universal Weapons Pylon. Wrap (UWP) one strap around each arm to restrain fuselage of helicopter. Shrink wrap the Universal Weapons Pylon as shown. Use caution when installing these straps to ensure they do not pinch the armament harnesses.



## OH-58D Skid Connecting Strap for Air, Marine, and Highway Transport (Rapid Deployment Landing Gear)



**Note:**

In addition to the chains or straps attached to the Rapid Deployment Landing Gear and the straps wrapped around the UWP, use a strap to connect the skid tubes just forward of the forward crosstube saddles and tiedowns. Tighten only enough to remove slack.

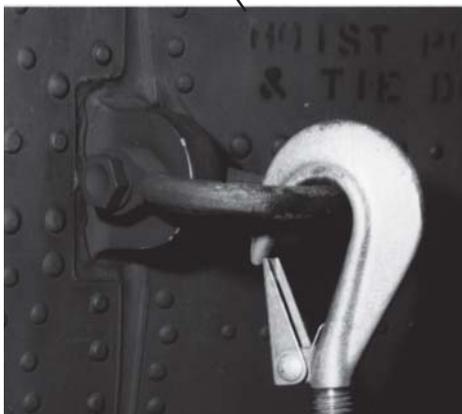
# Appendix D

## H-60 Black Hawk

TM 1-1520-237-S

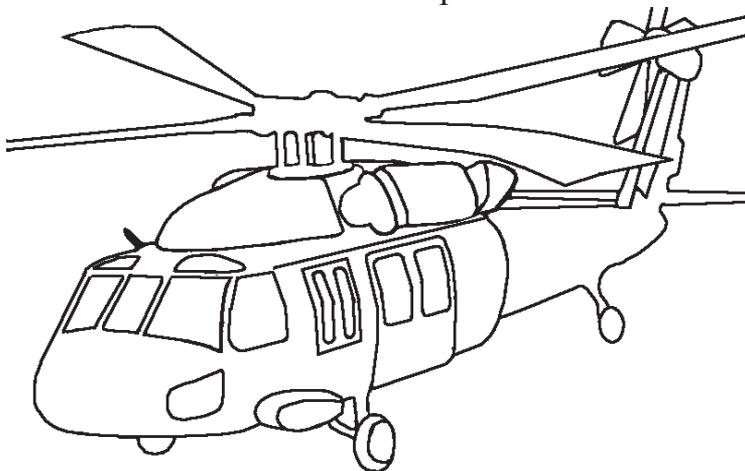


UH-60 Forward tiedown fitting



UH-60 Aft lifting/tiedown fitting

## H-60 Helicopter



### Models UH-60A, EH-60A, UH-60L, UH-60Q, HH-60L

Shipping Configuration	Length (in)	Width (in)	Height (in)	Weight (lbs) <sup>5</sup>	Comments
Reduced for Sealift	636 <sup>1</sup>	266	202	18,250 <sup>6</sup>	Fold main blades
Operational	644 <sup>2</sup>			17,600 <sup>7</sup>	
Reduced for Sealift	636 <sup>1</sup>	172	156	16,850 <sup>6</sup>	Above plus fold tail blades, remove External Stores Support System (ESSS)
	644 <sup>2</sup>			16,200 <sup>7</sup>	
Reduced for C-5 & C-17	636 <sup>1</sup>	117 <sup>3</sup>	156	16,200 <sup>6</sup>	Above plus remove horizontal stabilator
	644 <sup>2</sup>	129 <sup>4</sup>		16,000 <sup>7</sup>	

1. UH-60A, EH-60A, UH-60L models.

2. UH-60Q and HH-60L models.

3. Without Infrared Suppressors installed.

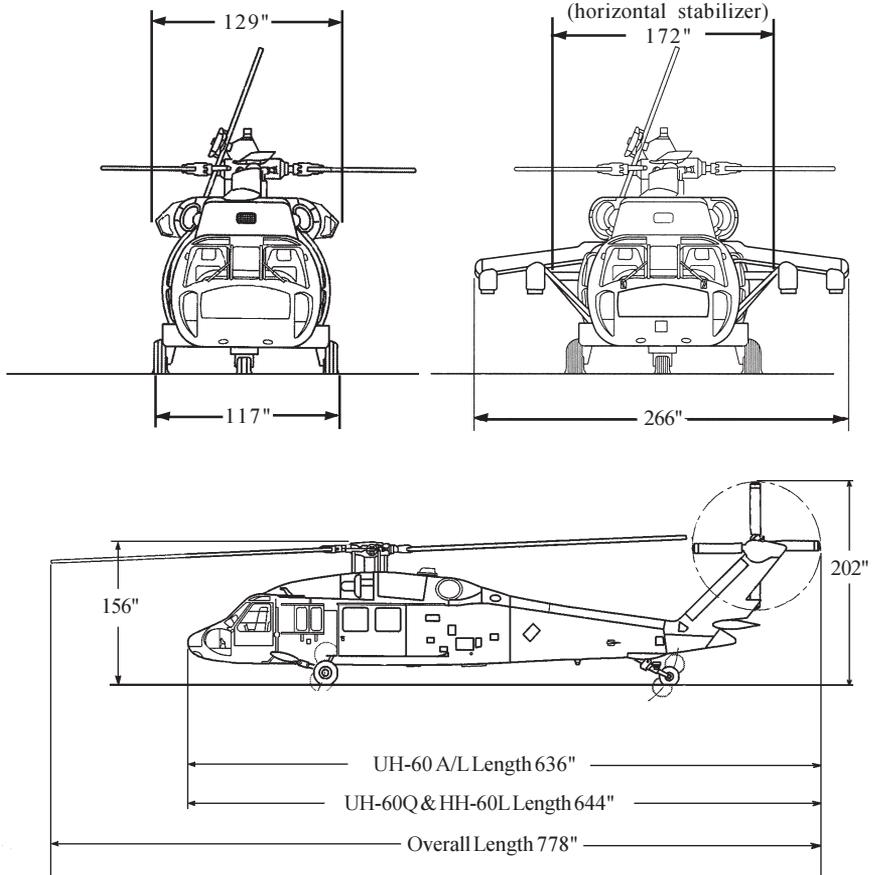
4. With Infrared Suppressors installed.

5. Weights are approximate. Actual weights will vary for individual helicopters.

6. UH-60L, HH-60L models.

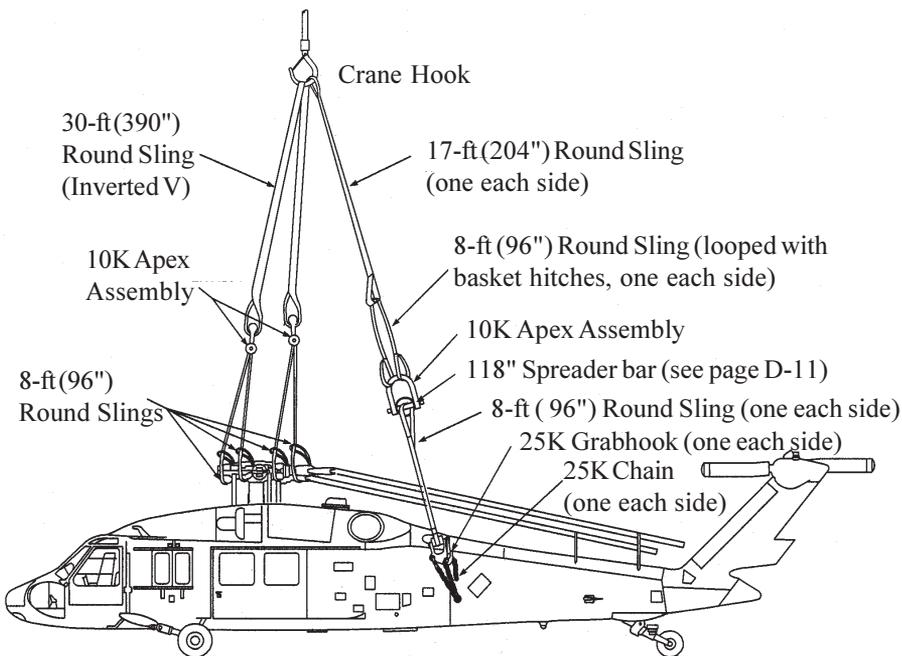
7. UH-60A, EH-60A, UH-60Q models.

# H-60 Helicopter Principal Dimensions



## H-60 Lifting Guidance for Highway and Marine Transport (main rotor hub and FS 485 lift/tiedown points)

**WARNING:** Use of the FS 308 tiedown points for lifting is prohibited  
The lifting procedure shown below is approved for highway and marine transport  
Maximum gross weight for lifting is 22,000 lbs



**Note:** The procedure shown above using the main rotor hub and the FS 485 lift/tiedown points utilizes round slings, a locally fabricated spreader bar, and components of the 10K and 25K helicopter external air transport slings sets. See pages D-5 through D-11 for more detailed information.

## H-60 Lifting Guidance for Highway and Marine Transport

**Note:** The equipment listed below is required when lifting from the main rotor hub and the FS 485 lift/tiedown points (page D-4), or when lifting from the main landing gear (MLG) drag beams and the FS 485 lift/tiedown points (page D-12).

### Equipment Required for Lifting

Nomenclature	NSN	Part Number (CAGE)	Quantity
30-ft Round Sling	1670-01-388-3917	PRS5E030(81996)	1 2 <sup>1</sup>
17-ft Round Sling	1670-01-388-3485	PRS2E017(81996)	2
8-ft Round Sling Size 3, 8,400 lbs	1670-01-388-8480	PRS3E008(81996)	8 <sup>2</sup> 4 <sup>3</sup>
8-ft Round Sling Size 2, 5,300 lbs	1670-01-388-6789	PRS2E008(81996)	8 <sup>2</sup> 4 <sup>3</sup>
10K Apex Assembly	4030-01-048-4045	38850-00004-045 (56646)	2
25K Grab Hook	4030-01-048-4047	38850-00011-046 (566460)	2
25K Chain	4030-01-058-4771	38850-00053-102 (81996)	2
118" Spreader Bar	Locally Fabricated	1670-EG-141 (See page D-11)	1
<ol style="list-style-type: none"> <li>1. Use two 30-foot Round Slings when lifting from the Main Landing Gear drag beams and the FS 485 lift/tiedown points.</li> <li>2. Use a total of eight 8-foot Round Slings, either size 2 or 3, when lifting from the main rotor hub and FS 485 lift/tiedown points.</li> <li>3. Use a total of four 8-foot Round Slings, either size 2 or 3, when lifting from the MLG drag beams and FS 485 lift/tiedown points.</li> </ol>			

## H-60 Lifting Guidance for Highway and Marine Transport

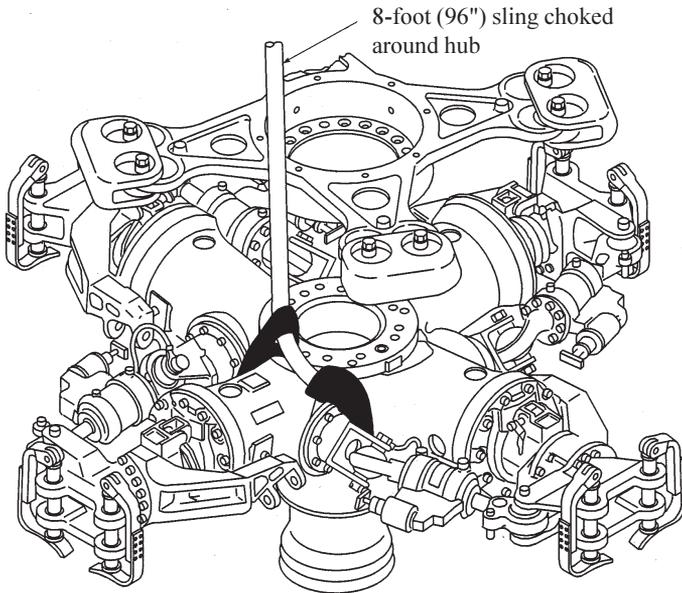
### **Rigging and Lifting Instructions (main rotor hub and FS 485 lift/tiedown points):**

1. Position wear pads next to eye on one end of each of four 8-foot round slings.
2. Loop eye end of 8-foot round sling around one arm of main rotor hub, routing sling between damper bracket and mast. Pass other end of sling through eye over hub arm (see page D-8). Position wear pad under hub arm and over bolt circle on damper bracket and choke sling snug on hub arm.
3. Repeat #2 for the three remaining 8-foot round slings and hub arms.
4. Separate sling legs choked around front two arms of hub from two slings choked around rear two arms to assist in making the required connections to the eye hook.
5. Center wear pad mid-way between two ends of the 30-foot round slings and form into a two-leg inverted "V" sling (see page D-9).
6. Attach a 10-ton eye hook or larger to each end of the 30-foot round sling using 10K assemblies (see page D-9).
7. For aft portion of lifting sling, assemble two 8-foot round slings to two 25K grab hooks and chains from the 25K cargo sling (see page D-10).
8. Form two 21-foot lifting lines by attaching 8-foot round slings in basket hitches to the end of a 17-foot round sling. Center 8-foot round sling wear pads in eyes of 17-foot round sling (see page D-10).
9. Connect one 21-foot upper sling line to each shackle on 118" spreader bar sling with two ends of basket slings in bow of shackles (see page D-10).
10. Connect one 8-foot round sling (with grab-hook and chain attached) to pins at each end of spreader bar (see page D-10).

## H-60 Lifting Guidance for Highway and Marine Transport (cont)

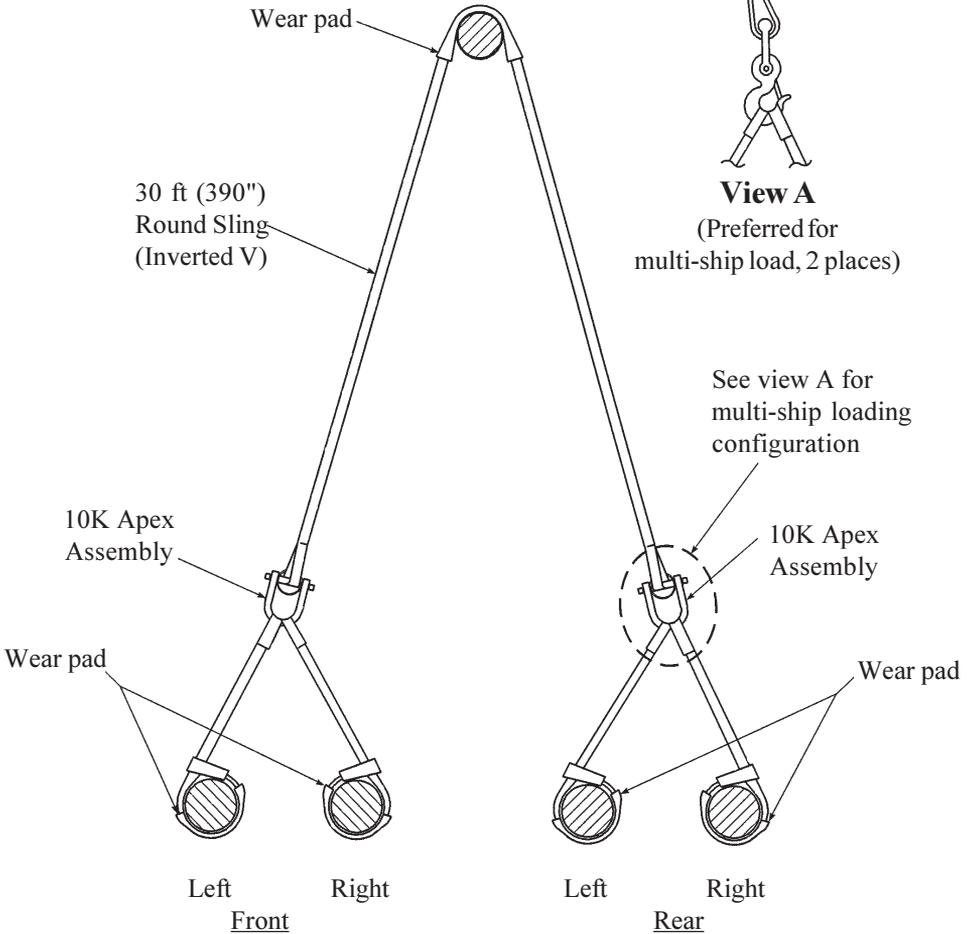
11. To attach assembly to crane hook, connect free ends of two 17-foot round slings to crane hook.
12. Center wear pad on 30-foot round sling and place wear pad over crane hook.
13. To attach lifting sling to helicopter, route one chain through aft lifting and tiedown ring (FS 485) and secure link number 30 in grab hook. Repeat procedure for other side of helicopter.
14. Attach 8-foot round slings attached to forward two arms of main rotor hub to eye hook in one end of 30-foot round sling. Attach two 8-foot round slings attached to aft two arms of main rotor hub to eye hook in other end of 30-foot round sling. To ensure equal loading of the hub, it is essential to attach one end of the 30-foot round sling to the forward arms of the main rotor hub, and the other end to the aft arms of the main rotor hub.
15. Attach two 50-foot-long tag lines (rope) to tail landing gear and stabilize tag lines during lifting operations.
16. Slowly raise hook to remove slack from sling. Adjust boom as necessary to center hook at apex of sling.
17. Slowly raise helicopter, checking attitude of helicopter as it is lifted. If main landing gear wheels are not off the ground by at least 1-foot before tailwheel clears the ground, lower helicopter to ground and adjust chain count in grab hook. Mark chain link to grab hook locations with tape for re-rig of sling at unloading.

## H-60 Rotor Head Rigging Showing Position of One 8-Foot Round Sling

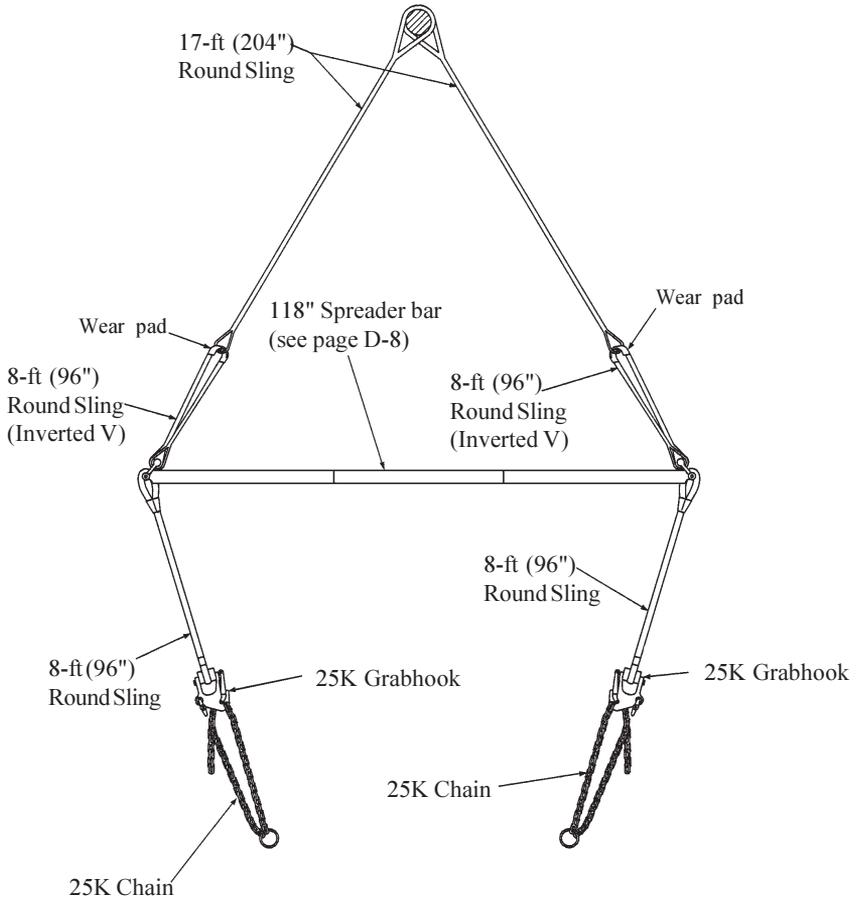


UH-60 Rotor hub assembly

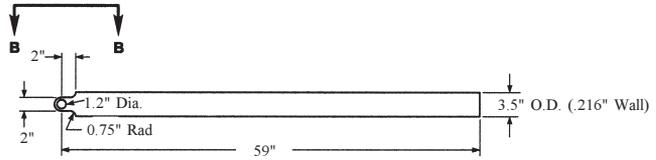
# Rotor hub sling assembly



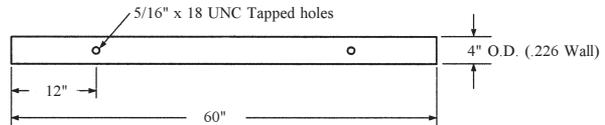
## Aft Lifting Sling Configuration



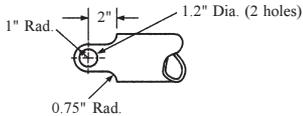
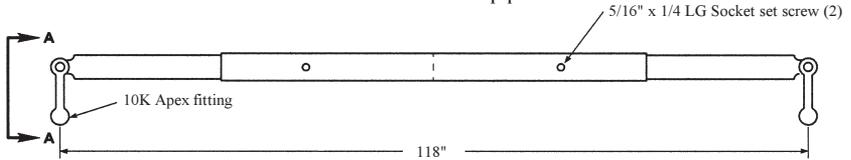
# H-60 Lifting spreader bar



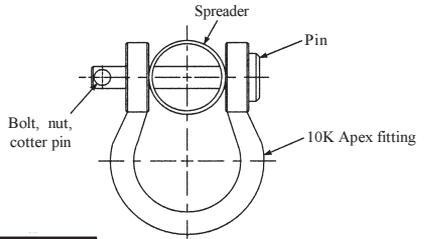
Inner tube - 3" pipe



Outer tube - 3.5" pipe



View B-B

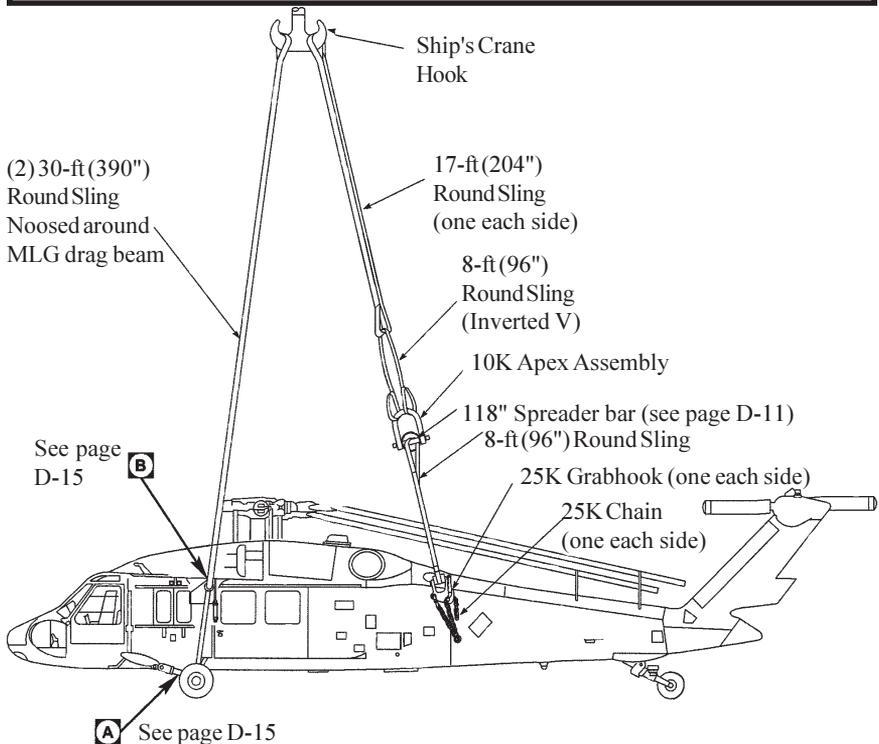


View A-A

Make From		
Qty	Nomenclature	Material
2	Inner tube - 3 inch nominal pipe size Schedule 40 pipe x 60 inches long	6061-T6 Aluminum alloy NSN 4710-00-421-1216 (20 ft length)
1	Outer tube - 3 1/2 inch nominal pipe size Schedule 40 pipe x 60 inches long	6061-T6 Aluminum Alloy
2	5/16" - 18 UNC x 1/4" long socket set screw	
2	Apex fitting assembly, P.N 38850-00004-045 (Minus spacer)	NSN 4030-01-048-4045

## H-60 Alternate Lifting Guidance for Marine Transport (MLG drag beams & FS 485 lift/tiedown points)

**WARNING:** Use of the FS 308 tiedown points for lifting is prohibited  
The lifting procedure shown below is approved for marine transport  
Maximum gross weight for lifting is 17,250 lbs



**Note:** The procedure shown above using the Main Landing Gear drag beams and the FS 485 lift/tiedown points utilizes round slings, a locally fabricated spreader bar, and components of the 10K and 25K helicopter EAT slings sets. See page D-5 for equipment required and pages D-13 through D-15 for more detailed information.

## H-60 Alternate Lifting Guidance for Marine Transport

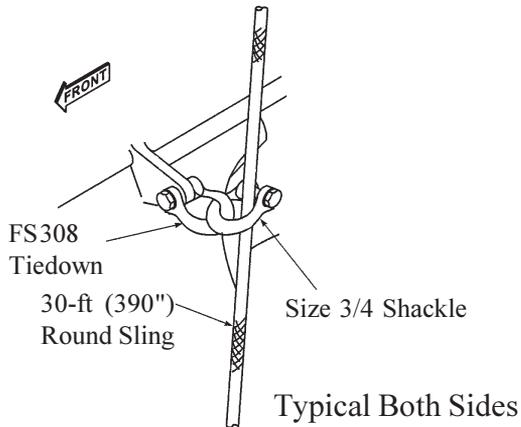
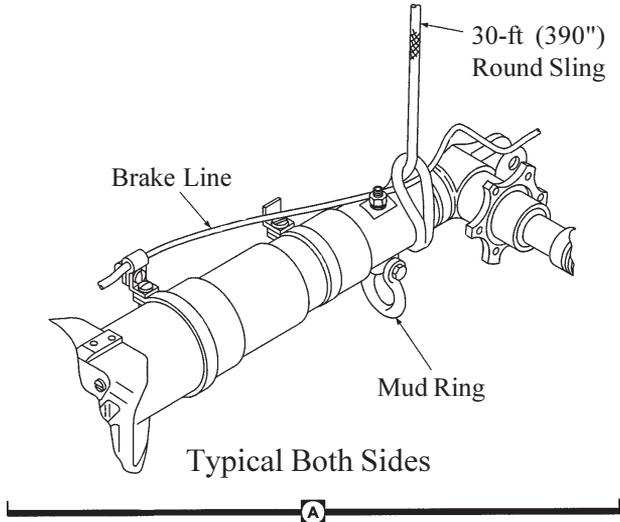
### **Rigging and Lifting Instructions (MLG drag beams and FS 485 lift/tiedown points):**

1. Remove shrink wrap from around main landing gear beams.
2. Remove one brake line mounting clamp from forward and aft drag beam and mud wing. Repeat for other drag beam.
3. To assemble aft portion of sling, connect two 8-foot round slings to two 25K grab hooks and chains (see page D-10).
4. Form two 21-foot lifting lines by attaching 8-foot round slings in basket hitches to the end of 17-foot round slings. Center 8-foot round slings wear pads in eyes of 17-foot round slings (see page D-10).
5. Connect one 21-foot upper sling line to each shackle on spreader bar with two ends of basket slings in the bow of shackles (see page D-10).
6. Connect one 8-foot round sling (with grab hook and chain attached) to pins at each end of spreader bar (see page D-10).
7. For forward portion of lifting sling use 30-foot round slings, forming a noose around drag beam between mud ring and aft bracket (see page D-15).
8. Route other end of round sling upward and over MLG oleo, through shackle at FS 308 tiedown point (see pages D-15 and D-16). Tape sling leg to shackle.
9. Repeat steps #7 and #8 for the other side of the helicopter.
10. Attach sling assembly to crane hook by connecting free ends of two aft 17-foot round slings and two forward 30-foot round slings to crane hook.
11. To attach lifting sling to helicopter, position sling assembly over helicopter.

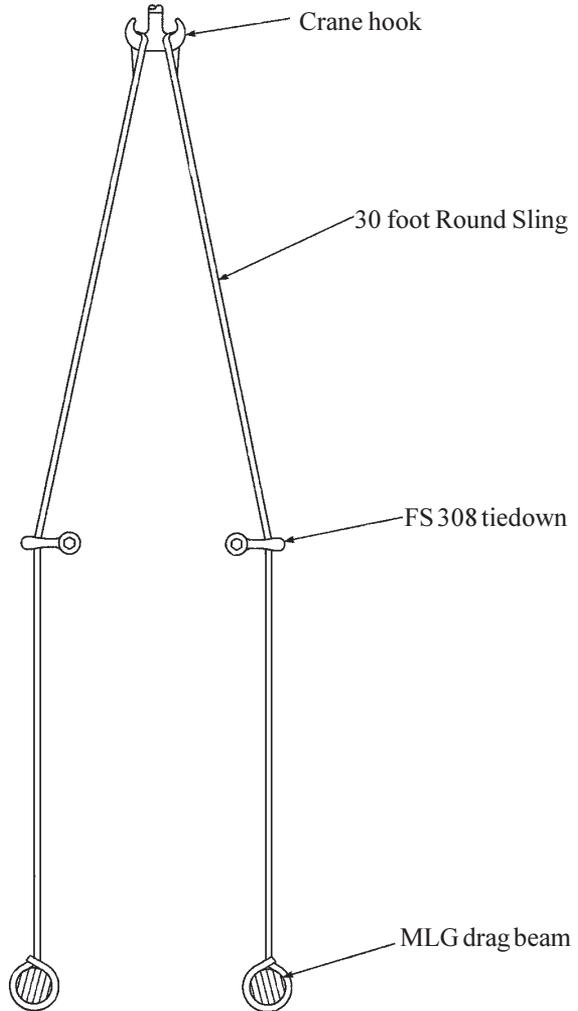
## H-60 Alternate Lifting Guidance for Marine Transport (cont)

12. Route one chain from spreader bar through FS 485 lift/tiedown point and secure link number 30 in grab hook. Repeat procedure for other side of helicopter.
13. Attach two (minimum) 50-foot-long tag lines (rope) to tail landing gear yoke.
14. Prior to lifting, ensure that all wear pads are centered and chains are hooked securely in grab links.
15. Slowly raise hook to remove slack from sling.
16. Slowly raise helicopter checking attitude of helicopter as it is lifted. If attitude exceeds level by plus or minus 4° (tail wheel 2 feet above or below main wheels), lower helicopter and adjust count in grab hook. Mark chain link to grab hook locations with tape for re-rig of sling at unloading.

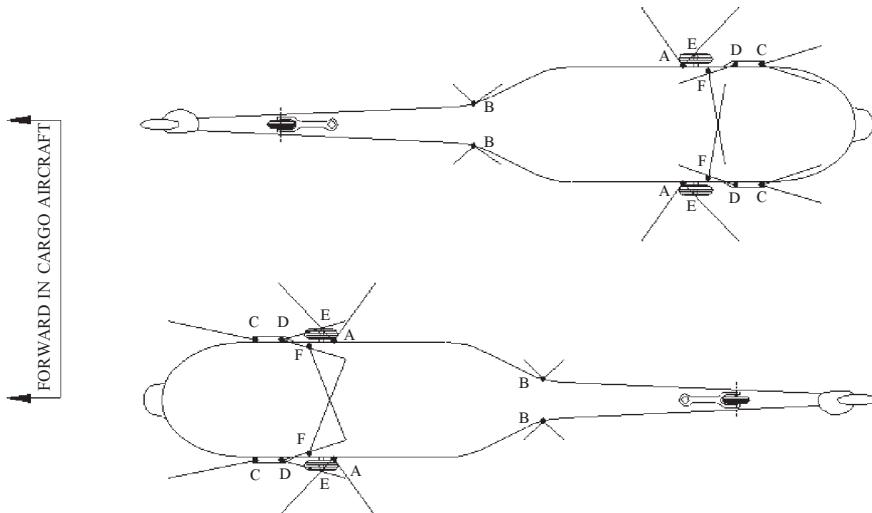
# H-60 Alternate Lifting Guidance for Marine Transport



# Main Landing Gear Drag Beam Sling Assembly



## H-60 Helicopter Tiedown for Air Transport



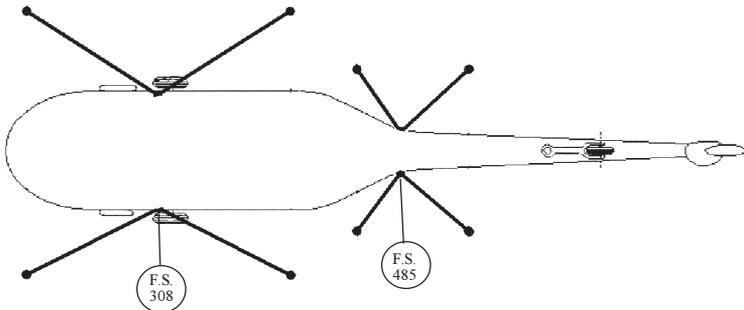
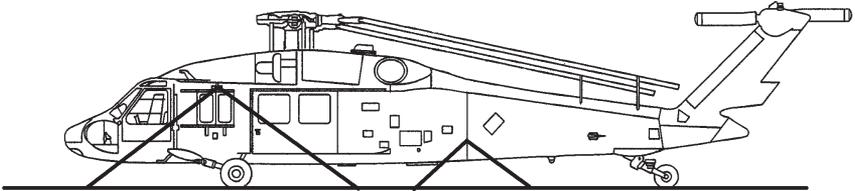
### Notes:

1. Use MB-1 chains on forward points, intermediate points and mud rings (A, B & F).
2. Use MB-2 chains on removable towplates (C & D).
3. 16 chains are required to secure one helicopter.

### Tiedown Design Limit Loads (lbs)

Index	Description	Vertical	Forward	Aft	Lateral	Location
A	Forward Points	17,592	8,000	8,000	17,200	FS308
B	Intermediate Points	3,600	2,400	2,400	3,600	FS485
C & D	Removable Tow Plates	6,000	20,000	20,000	6,000	FS242 FS263.5
E	Axle Tiedown Ring	5,000	5,500	5,500	8,600	FS297.3
F	Mud Rings	10,000	5,400	5,400	9,200	FS287

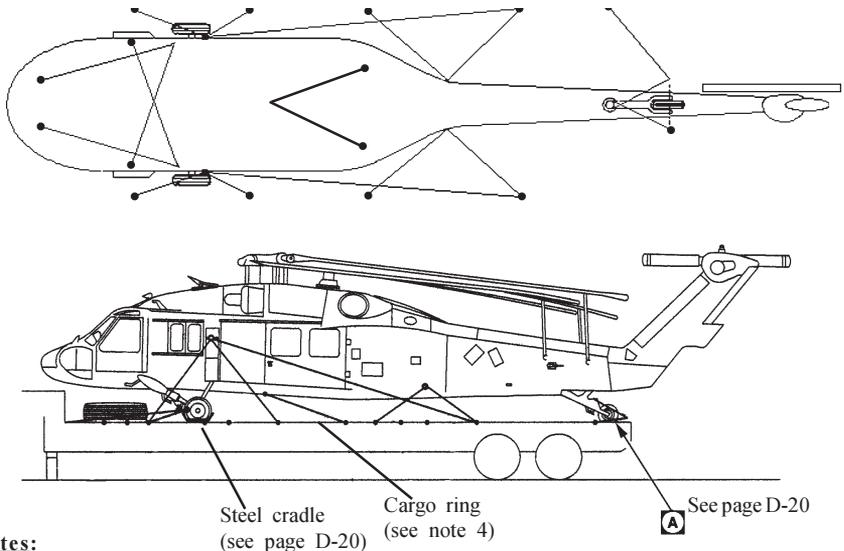
## UH-60 Helicopter Tiedown for Marine Transport



### **Notes:**

1. Secure all tiedowns at an angle between 30° and 60°, 45° is the ideal.
2. Use only MB-1 chains or polyester straps with a breaking strength of at least 15,000 lbs. For U.S. straps, where the working load limit is printed on the label of the strap, the minimum breaking strength is 3 times the working load limit. For foreign straps, the breaking strength will usually be printed on the label of the strap.
3. Use individual chains or straps for each line (8 req'd). Do not run the tiedowns through the aircraft shackles. Attach chains or straps directly to the provisions.
4. Apply only enough tension to remove slack from the tiedown devices.

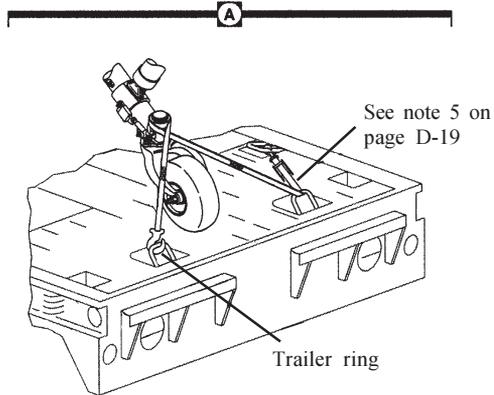
## H-60 Helicopter Tiedown for Tactical Highway Transport



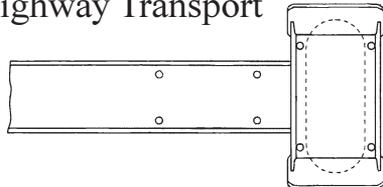
### Notes:

1. Tiedown helicopter using the axle tiedown rings, FS 308 tiedowns, FS 485 tiedowns, and cargo ring.
2. Use only MB-1 or MB-2 chains, or polyester straps with a breaking strength of at least 10,000 lbs. For U.S. straps, where the working load limit is printed on the label of the strap, the minimum breaking strength is 3 times the working load limit. For foreign straps, the breaking strength will usually be printed on the label of the strap.
3. Use individual chains or straps for each line (16 req'd) except for the cargo hook tiedown and the tail wheel tiedown (see note 4 and 5).
4. Route one chain or strap from trailer ring through helicopter cargo hook and back to a different trailer ring.
5. Route cargo strap from trailer ring, crisscross around tail wheel, through a trailer ring, and back to a different trailer ring (see page D-20).
6. Load and tiedown spare tire and stabilator using 3K straps.

## Tail Wheel Tiedown for Highway Transport

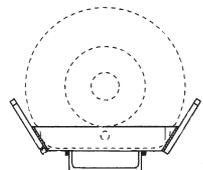
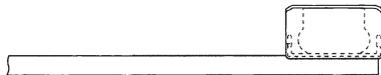


## Steel Cradle for Highway Transport

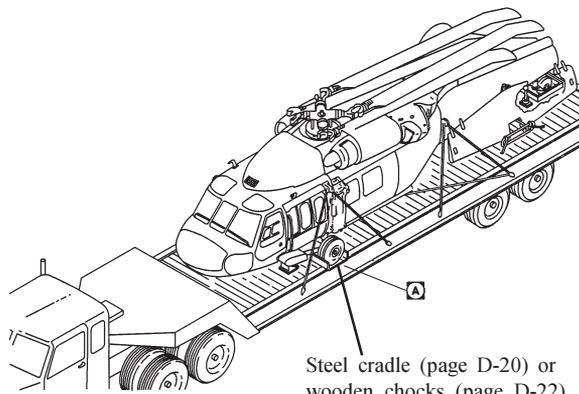
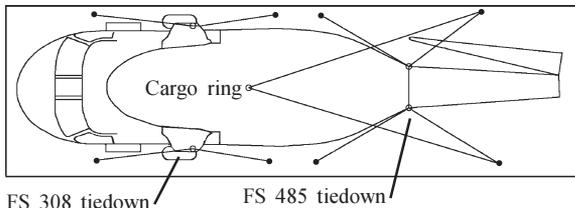


### **Notes:**

1. Additional holes may be drilled to accommodate trailer bed.
2. This assembly is to be used for flatbed trailer shipment of one H-60 Blackhawk helicopter.
3. Right side shown, left side similar.



## H-60 Helicopter Tiedown for Logistical Highway Transport



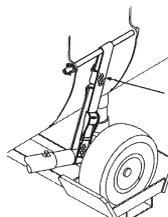
Steel cradle (page D-20) or  
wooden chocks (page D-22)

### Notes:

1. Use only MB-1 or MB-2 chains, or polyester straps with a breaking strength of at least 10,000 lbs. For U.S. straps, where the working load limit is printed on the label of the strap, the minimum breaking strength is 3 times the working load limit. For foreign straps, the breaking strength will usually be printed on the label of the strap.
2. Use individual chains or straps for each line (10 req'd + 2 additional for drag beams). Do not run the tiedowns through the aircraft shackles.
3. Install supports for main landing gear, tail wheel and tail pylon, and cradle for stabilator.



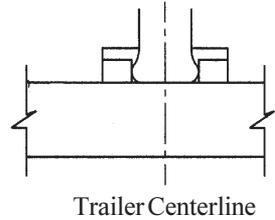
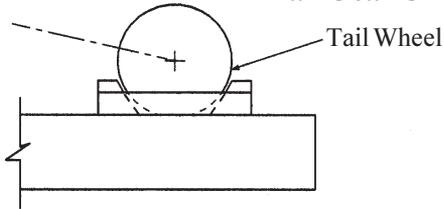
10K Cargo Strap



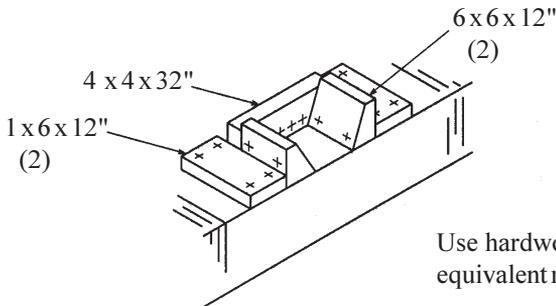
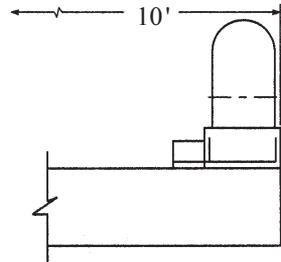
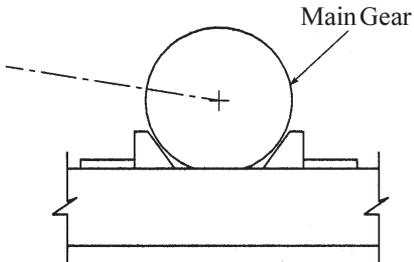
Left side shown  
(typical for both sides)

# Wooden Chocks for Highway Transport

## Tail Gear Chocking



## Main Gear Chocking



Use hardwood or equivalent material

# Appendix E

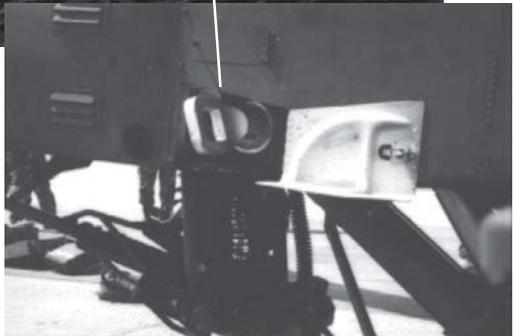
## AH-64 Apache

TM55-1520-238-S

### TM1-1520-LONGBOW APACHE



AH-64 Tailboom tiedown fitting



AH-64 Helicopter forward fuselage tiedown fitting

**AH-64A Model**

Shipping Configuration	Length (in)	Width (in)	Height (in)	Weight (lbs)	Comments
Reduced for Sealift Operational	603	206	183	11,712	Remove main rotor blades
Reduced for Sealift	603	206	151	11,700	Remove main rotor blades, Air Data System (ADS) and deicing mast, VHF antenna, and rotate tail rotor
Reduced for C-5 or C-17	603	109	151 <sup>1</sup>	13,000	above plus remove wings w/pylons, wire cutter, other antennas, horizontal stabilator, and tail rotor blades as required <sup>2</sup>
1. For C-17, load helicopters under center of wingbox.					
2. If spacing permits, the wings and horizontal stabilator do not have to be removed.					

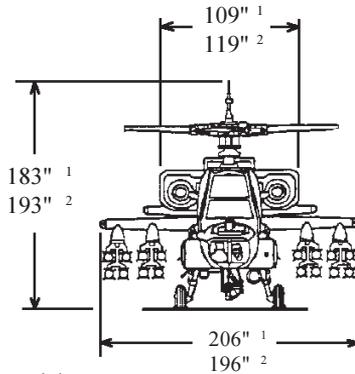
**AH-64D Model**

Shipping Configuration	Length (in)	Width (in)	Height (in)	Weight (lbs)	Comments
Reduced for Sealift Operational	603	196	193	13,807	Remove main rotor blades
Reduced for Sealift	603	196	151	11,700	Remove main rotor blades, derotation unit, torque tube, MMA, VHF antenna, and rotate tail blades
Reduced for C-5 or C-17	603	119	151 <sup>1</sup>	13,000	above plus remove wings w/pylons, horizontal stabilator, other antennas, and tail rotor blades as required <sup>2</sup>
1. For C-17, load helicopters under center of wingbox.					
2. If spacing permits, the wings and horizontal stabilator do not have to be removed.					

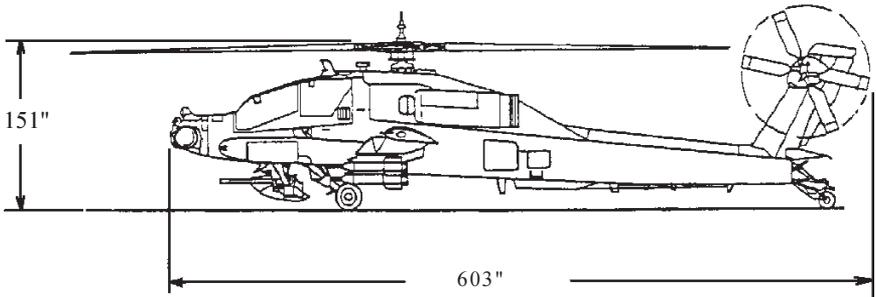
**AH-64A/D with Main Rotor Blade Fold Kit (MRBFK) and Mast Mounted Assembly (MMA)**

Shipping Configuration	Length (in)	Width (in)	Height (in)	Weight (lbs)	Comments
Reduced for C-5 or C-17 (wings on)	603	196	151	14,880 <sup>1</sup>	Move MMA to fuselage mount and fold main rotor blades
Reduced for C-5 or C-17 (wings off)	603	119	151	14,880 <sup>1</sup>	Same as above, plus remove wings and horizontal stabilator
1. Maximum certified air transport weight.					

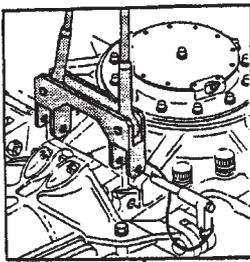
# AH-64 Helicopter Principal Dimensions



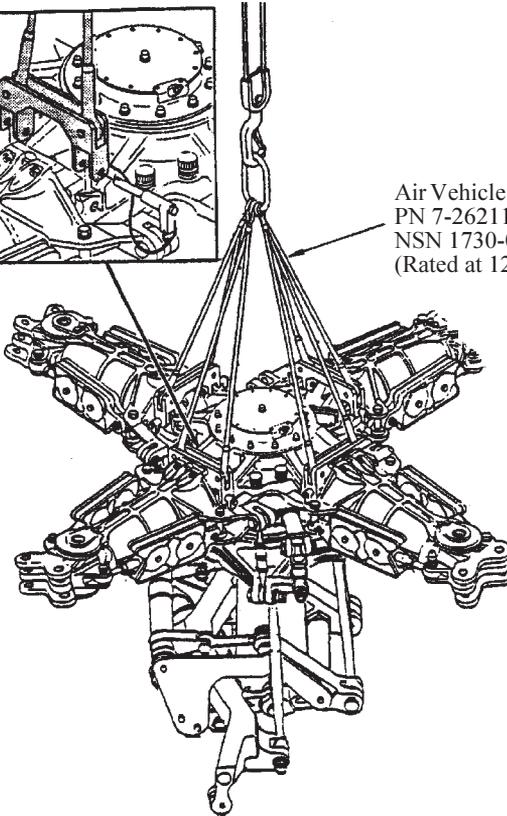
- 1. AH-64A model
- 2. AH-64D model



## AH-64 Helicopter Lifting Guidance for Highway and Marine Transport

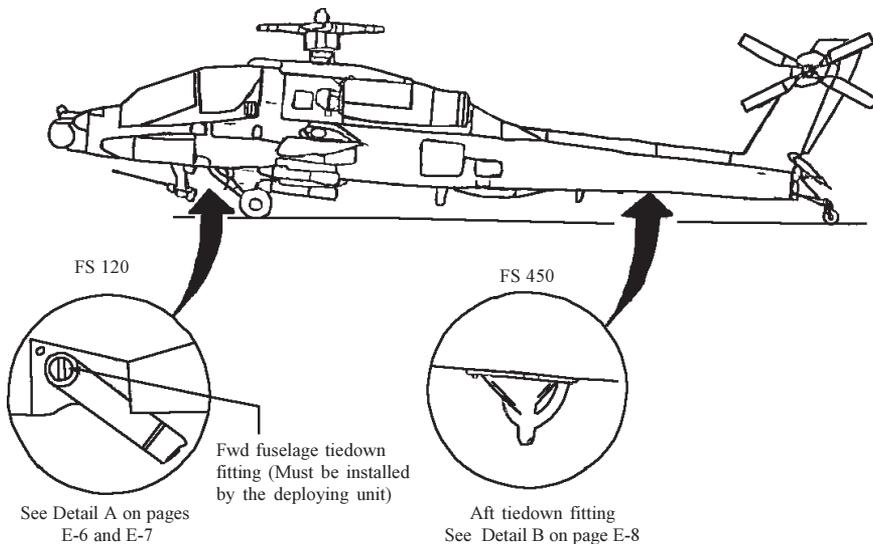


Air Vehicle Sling Assembly  
PN 7-262110009-601  
NSN 1730-01-165-6861  
(Rated at 12,700 lbs)



**Note:** Rig main rotor head with Air Vehicle sling assembly as shown and lift helicopter. The hub sling assembly (shown on D-8 and D-9) used for the UH-60 and 8-ft round slings may also be used for the AH-64. Choke each arm between the mast and pitch change link lug.

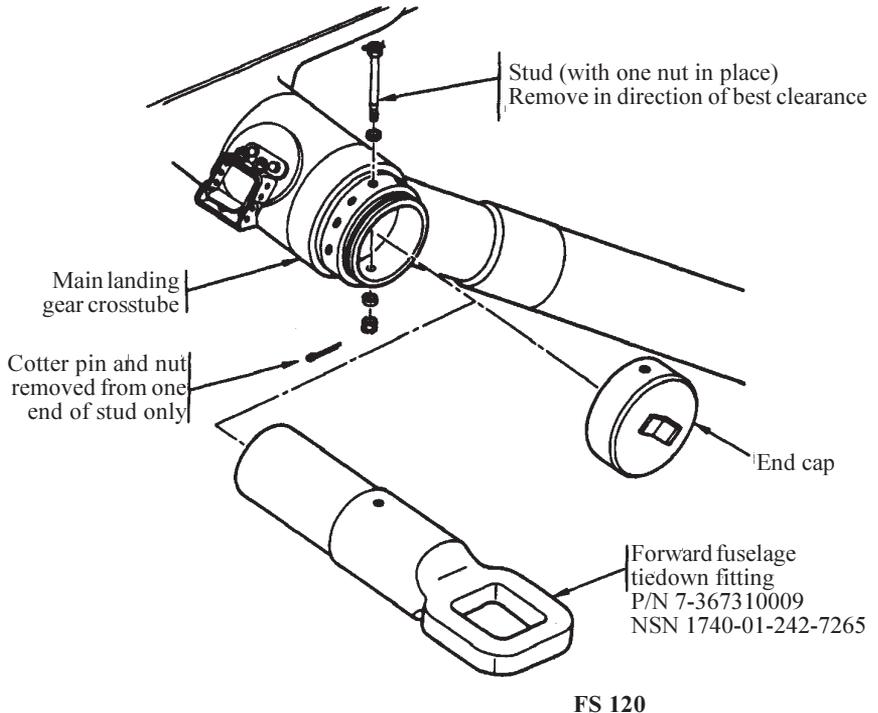
## AH-64 Helicopter Tiedown Installation



**Note:** Install forward fuselage tiedown fittings as shown on pages E-6 and E-7.

# AH-64A Apache Forward Fuselage Tiedown Fitting

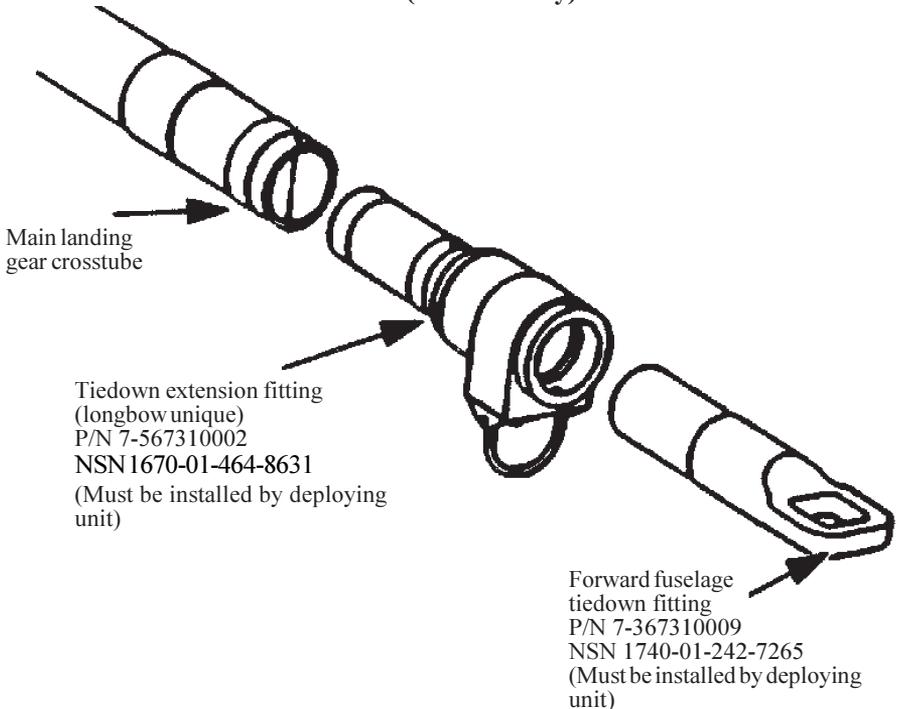
Detail A (AH-64A Only)



**Note:** Left side shown, typical for both sides

## AH-64D Longbow Apache Forward Fuselage Tiedown Extension and Tiedown Fitting

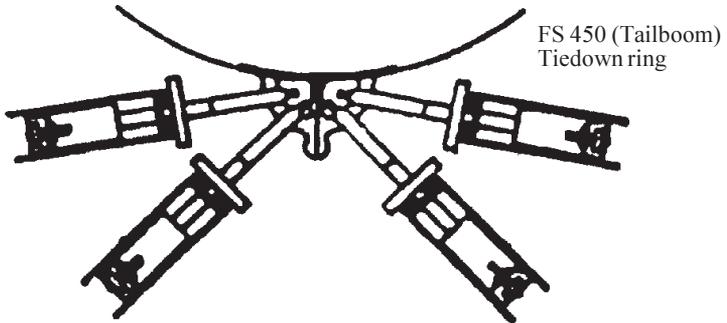
Detail A (AH-64D Only)



**Note:** Left side shown, typical for both sides

## AH-64 Helicopter Aft Fuselage Tiedown Fitting

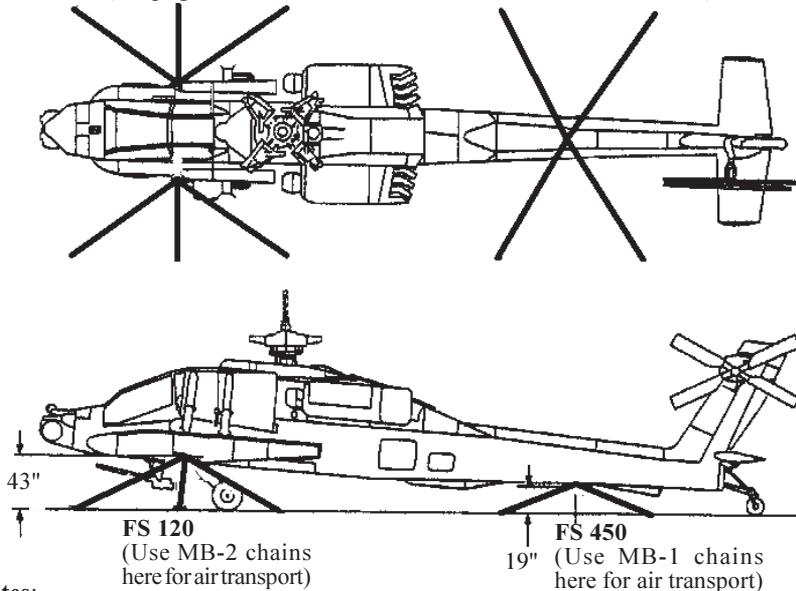
Detail B



**Note:** Attach MB-1 chains or straps with a breaking strength of 10,000 lbs directly to the aft tiedown provision. Do not run chains through the provision.

## AH-64 Tiedown for Marine and Air Transport

(see page E-10 & E-11 for the AH-64 w/MRBFK & MMA)



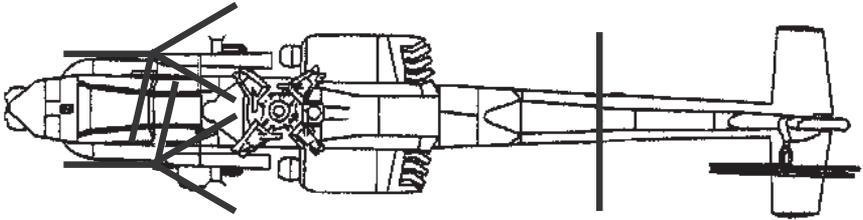
### Notes:

1. Secure all tiedown devices at angles between 30° and 60°, 45° is the ideal.
2. For marine transport, use only MB-1 and MB-2 chains, or polyester straps with a breaking strength of at least 10,000 lbs. For U.S. straps, where the working load limit is printed on the label of the strap, the minimum breaking strength is 3 times the working load limit. For foreign straps, the breaking strength will usually be printed on the label of the strap.
3. For air transport, use only MB-1 or MB-2 chains. Polyester straps are not approved for air transport and should not be used.
4. Use individual chains or straps for each tiedown line shown above (10 req'd).
5. Apply only enough tension to remove slack from the tiedown devices.
6. See page E-13 for more information when using straps with the FS 120 tiedowns.

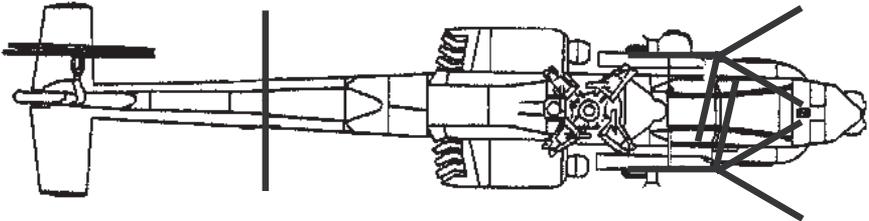
## AH-64 with Main Rotor Blade Fold Kit (MRBFK) and Mast Mounted Assembly (MMA)



## AH-64 with MRBFK and MMA Tiedown for Air Transport (wings on or off)



Nose of AH-64 facing forward in aircraft

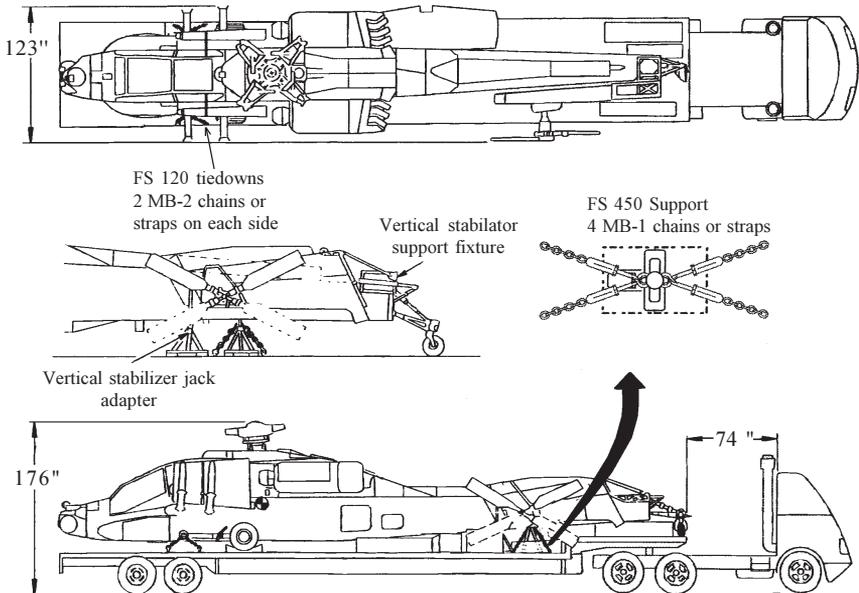


Nose of AH-64 facing aft in aircraft

### Notes:

1. Secure all tiedown devices at the angles shown above. The angle of the tiedowns with the aircraft cargo floor should be approximately 30°.
2. For air transport, use only MB-1 or MB-2 chains. Polyester straps are not approved for air transport and should not be used.
3. Use individual chains or straps for each tiedown line shown above (10 req'd).
4. Apply only enough tension to remove slack from the tiedown devices.
5. This tiedown procedure may be used if the wings are either on or off the helicopter.

## AH-64 Tiedown for Highway Transport



### **Notes:**

1. Use only MB-1 and MB-2 chains, or polyester straps with a breaking strength of at least 10,000 lbs. For U.S. straps, where the working load limit is printed on the label of the strap, the minimum breaking strength is 3 times the working load limit. For foreign straps, the breaking strength will usually be printed on the label of the strap.
2. Use individual chains or straps for each tiedown line shown above (8 req'd).
3. See page E-13 for more information when using straps with the FS 120 tiedowns.

## Using Polyester Straps with the FS 120 Tiedown



Photo showing how straps are looped through the FS 120 tiedown provisions

**Note:**

When using polyester straps at the FS 120 tiedowns, attach three separate straps as shown above. Attach each strap to a fitting on the floor, run it through the FS 120 tiedown, and attach it back to the same fitting as the other end of the strap.

## Bibliography

- TM55-1520-242-S *Preparation for Shipment of UH-1 Helicopters.*
- TM 1-1520-241-S *Preparation for Shipment of CH-47 Helicopters.*
- TM1-1520-248-S *Preparation for Shipment of OH-58D Helicopters.*
- TM1-1520-237-S *Preparation for Shipment of UH-60 Helicopters.*
- TM55-1520-238-S *Preparation for Shipment of AH-64A Helicopters.*
- TM1-1520-Apache/  
Longbow *Interactive Electronic Technical Manual for the AH-64D.*
- TO1C-5A-9-2 *Supplemental Loading Instructions Manual Specific Procedures, Section IV: On/Off Loading Procedures for Helicopters.*
- TO1C-17A-9 *Preliminary Loading Instructions, Section VIC: Helicopters.*

# Index

Model	Page No.
AH-64 Apache, Lifting.....	E-1
AH-64 Apache, Tiedown.....	E-5
CH-47 Chinook, Lifting.....	B-1
CH-47 Chinook, Tiedown.....	B-13
OH-58 Kiowa, Lifting.....	C-1
OH-58 Kiowa, Tiedown.....	C-11
UH-1 Iroquois, Lifting.....	A-1
UH-1 Iroquois, Tiedown.....	A-5
UH-60 Black Hawk, Lifting.....	D-1
UH-60 Black Hawk, Tiedown.....	D-17